TELEVISION INQUIRY

THE UNIVERSITY
OF MICHIGAN

JUN 1 1960

MAIN
READING ROOM

HEARINGS

BEFORE THE

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE UNITED STATES SENATE

EIGHTY-SIXTH CONGRESS

SECOND SESSION

ON

THE FINAL PHASE OF THE COMMITTEE'S INQUIRY WITH REFERENCE TO OVERALL TELEVISION ALLOCATIONS

FEBRUARY 2, 4, AND 5, 1960

PART 8

TELEVISION ALLOCATIONS

Printed for the use of the Committee on Interstate and Foreign Commerce

note - pts 1-4 Jan - July 1956
pt 5 Mar 1957
pt 6,7 May - June 1958

Bd. in earlier hearings of this Committee

UNITED STATES
GOVERNMENT PRINTING OFFICE
53043 WASHINGTON : 1960

COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

WARREN G. MAGNUSON, Washington, *Chairman*

JOHN O. PASTORE, Rhode Island
A. S. MIKE MONRONEY, Oklahoma
GEORGE A. SMATHERS, Florida
STROM THURMOND, South Carolina
FRANK J. LAUSCHE, Ohio
RALPH YARBOROUGH, Texas
CLAIR ENGLE, California
E. L. BARTLETT, Alaska
VANCE HARTKE, Indiana
GALE W. McGEE, Wyoming

ANDREW F. SCHOEPPEL, Kansas
JOHN MARSHALL BUTLER, Maryland
NORRIS COTTON, New Hampshire
CLIFFORD P. CASE, New Jersey
THRUSTON B. MORTON, Kentucky
HUGH SCOTT, Pennsylvania

EDWARD JARRETT, *Chief Clerk*
JOHN M. MCELROY, *Assistant Chief Clerk*
HAROLD I. BAYNTON, *Chief Counsel*
JAMES E. BAILEY, *Assistant Chief Counsel*
KENNETH A. COX, *Special Counsel on Television Inquiry*
NICHOLAS ZAPPLE, *Staff Counsel*

Hearings held during the 84th and 85th Congresses in connection with the television inquiry, including testimony on S. 825 by Mr. Bricker, to authorize the Federal Communications Commission to establish rules and regulations and make orders with respect to networks and their activities, were printed in seven volumes, as follows:

Part I: UHF–VHF Allocations Problem (testimony of Federal Communications Commission), 84th Congress
Part II: UHF–VHF Allocations Problem, 84th Congress
Part III: Subscription Television, 84th Congress
Part IV: Network Practices, 84th Congress
Part V: Allocations—Testimony of Federal Communications Commission, Additional Supplement on Network Practices, 85th Congress
Part VI: Review of Allocations Problem and Special Problems of TV Service to Small Communities, and S. 376, 85th Congress
Part VII: The Television Rating Services

DEPOSITED BY THE
UNITED STATES OF AMERICA

CONTENTS

Statement of—
Ayres, Hon. William Hanes, a U.S. Representative from the 14th District of Ohio, House Office Building, Washington, D.C. — Page 4567
Beckman, Alfred R., vice president, American Broadcasting Co., 1735 DeSales Place NW., Washington, D.C. (accompanied by Frank Marx, ABC, vice president in charge of engineering; and Robert H. Hinckley, director and member of the executive committee of American Broadcasting-Paramount Theatres, Inc.) — 4768
Cowperthwait, Hart S., Chief, Rules and Standards Division, Federal Communications Commission, Washington, D.C. — 4651
Craven, Hon. T. A. M., Commissioner, Federal Communications Commission, Washington, D.C. — 4620
Cross, Hon. John S., Commissioner, Federal Communications Commission, Washington, D.C. — 4632
Doerfer, Hon. John C., Chairman, Federal Communications Commission, Washington, D.C.
Accompanied by Commissioners Frederick W. Ford, Rosel H. Hyde, T. A. M. Craven, John S. Cross, Robert E. Lee, and Robert T. Bartley — 4574
Essex, Martin, superintendent, Akron Public Schools, Akron, Ohio — 4854
Ford, Hon. Frederick W., Commissioner, Federal Communications Commission, Washington, D.C. — 4626
Hyde, Hon. Rosel H., Commissioner, Federal Communications Commission, Washington, D.C. — 4715
Lee, Hon. Robert E., Commissioner, Federal Communications Commission, Washington, D.C. — 4621, 4665, 4703
Putnam, William L., president, Springfield Television Broadcasting Corp., Springfield, Mass. — 4857
Report submitted:
Comments of Federal Communications Commission on Report of the Ad Hoc Advisory Committee on Allocations (Bowles report) to the Senate Committee on Interstate and Foreign Commerce — 4565
Letters, telegrams, etc.:
Ayres, Hon. William H., a U.S. Representative from the 14th District of Ohio, House Office Building, Washington, D.C. — 4787
Beckman, Alfred R., vice president, American Broadcasting Co., 1735 DeSales Place NW., Washington, D.C. — 4777
Berg, Hon. Leo, mayor, city of Akron, Akron, Ohio — 4561
Brittain, George William, executive secretary, Akron and Cuyahoga Falls division, Chamber of Commerce, Akron, Ohio — 4563
Dugan, Leo E., executive secretary, Akron Labor Council, Akron, Ohio — 4562
Essex, Martin, superintendent of schools, Akron public schools, Akron, Ohio — 4563
Ford, Hon. Frederick W., Chairman, Federal Communications Commission, Washington, D.C. — 4889
Hairgrove, Jim, general manager, KFRD 980, Fort Bend Broadcasting Co., Inc., Rosenberg, Tex. — 4564
Hyde, Hon. Rosel H., Acting Chairman, Federal Communications Commission, Washington, D.C. — 4753
Morris, Miss Mary Jane, Secretary, Federal Communications Commission, Washington, D.C. — 4873

Letters, telegrams, statements, etc.—Continued
Page
Wilson, George E., executive director, Area Development Committee, Akron, Ohio ---- 4562
Woodyard, Ronald B., Skyland Broadcasting Corp., radio station WONE, Dayton, Ohio ---- 4869
Zias, Joseph F., Esq., attorney for South Central Broadcasting Corp. (WTVK), law offices of Loucks, Zias & Jansky, 1317 F Street NW., Washington, D.C. ---- 4869

TELEVISION INQUIRY—ALLOCATIONS PHASE

TUESDAY, FEBRUARY 2, 1960

U.S. SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
SUBCOMMITTEE ON COMMUNICATIONS,
Washington, D.C.

The subcommittee was called to order at 10:02 a.m., in room 5110, New Senate Office Building, Hon. John O. Pastore, presiding.

Senator PASTORE. It is 2 minutes after 10. This is scheduled for 10 o'clock. The committee is ready and if you are, we are ready to go.

This open hearing is the start of the final phase of the committee's inquiry with reference to overall television allocations. It is my hope that as we complete this series of hearings, the committee will have obtained definitive answers from the FCC as to its policy and program with reference to the development of a truly nationwide competitive television service.

This committee has been concerned with this problem for nearly 6 years. Extensive hearings were held in 1954, and staff reports were published with respect to the problem. Further hearings were held in 1956 and 1957, and in July of 1956 the committee issued an interim report on allocations. Further hearings were held in 1958 with respect to the problem, and last year the Commission filed with the committee statements as to the alternative policies then being considered. Throughout this period, the committee has discussed the various proposals with the Commission and has sought to assist it in the development of a sound program for the future of American television. However, in the nature of things the responsibility for action in this highly technical area lies with the Commission.

To critics of the Commission who have appeared before our committee, it has seemed that throughout this period the Commission has done certain things, and has failed to take other action, with resulting disastrous impact upon UHF television. In November 1955 the majority of the Commission, as then constituted, denied certain applications for the deintermixture of specified markets to all UHF service on the asserted ground that these proposals did not constitute a nationwide answer to the problem. The majority thereupon proceeded to make grants of first or second VHF facilities in a number of these areas despite the clear warnings that to do so would seriously impair the future of UHF broadcasting.

When this committee issued its interim report on allocations in July of 1956 it commented favorably upon action taken shortly before by the Commission in which it undertook an interim program of

(NOTE.—Staff members assigned to these hearings: Kenneth A. Cox, special counsel, and Nicholas Zapple, staff counsel.)

deintermixture and stated that of the various proposals made to it in the course of its general allocations rulemaking proceeding, the only one meriting further consideration was the proposal to shift all television, or a substantial portion of it, to the UHF frequencies.

This committee took these assertions at face value in the hope that the Commission was on its way to a final solution of this problem. However, the results of the program outlined in the Commission's report and order of June 1956 have been disappointing in the extreme.

UHF stations continued to leave the air in the face of unequal competition. The Commission had pointed hopefully to the entry of multiple owners into UHF broadcasting but NBC, CBS, and Storer Broadcasting Co., each of which had acquired two UHF stations in substantial intermixed markets, have during this period all disposed of these stations or taken them off the air.

When the Commission appeared before the committee in January 1956 there were still 99 commercial UHF stations on the air, but that number is now down to 77. This is all that is left of the total of 172 UHF stations which have gone on the air, an attrition rate of 55.2 percent. A realistic look at those on the air will reveal that many of them are seeking VHF channels or waiting in hope that the Commission will adjust its policies to permit them to compete on equal terms.

Last April the Commission submitted to our committee a written statement setting forth five possible long-range allocations policies, and Commissioner Lee submitted a separate statement urging his individual position with respect to the desirability of an all-UHF service. It is our hope that the Commission has now reached a decision with respect to these alternatives, or can indicate to the committee the direction in which they are proceeding and can assure us of the prompt announcement of the Commission's final conclusions on this matter. We recognize that the Commission has had many nonallocation matters under consideration during these years. However, you have repeatedly assured us that this is a matter of the highest priority with you.

It is not my purpose here to waste the time of the Commission nor of this committee with further vague discussion of this admittedly difficult problem. In like manner, it is not my purpose to criticize the Commission for mistakes in the past, if mistakes have been made. But it is my purpose to reiterate that the committee feels that after nearly 6 years of wrestling with this problem it is entitled to look to this Commission for a decision which will permit you to chart for the next 10 or 20 years the course to be pursued in execution of your responsibility for the development of the sort of television system which this country must have.

I want to emphasize that I have no particular interest in the success or failure of any given broadcaster in any area so long as the public receives acceptable service; but where the failure of a station or a series of stations—such as that which has been taking place with respect to UHF operators—leaves more and more communities with inferior service, or with no local service at all, then such a development becomes a matter of real and immediate public concern.

It is to this end that I hope to receive clear-cut, specific answers from the FCC as to what its policy is with reference to the utilization of UHF and VHF television channels in the Commission's overall plan for the future of television. The public should know and the public is entitled to know specifically the kind of service and the amount of service it will have available.

I would like at this time to make the following a part of the official hearing record:

1. Letter dated June 5, 1959, to Hon. Warren G. Magnuson, from Mayor Leo Berg, city of Akron, Ohio;

2. Letter dated June 11, 1959, to Hon. Warren G. Magnuson, from George E. Wilson, executive director, Area Development Committee, 805 First National Tower, Akron, Ohio;

3. Letter dated June 4, 1959, to Hon. Warren G. Magnuson, from Leo E. Dugan, executive secretary, Akron Labor Council, AFL–CIO, 672 South Main Street, Akron, Ohio;

4. Letter dated June 4, 1959, to Hon. Warren G. Magnuson, from Martin Essex, superintendent of schools, Akron public schools, 70 North Broadway, Akron, Ohio;

5. Letter dated May 28, 1959, to Hon. Warren G. Magnuson from George William Brittain, executive secretary, Akron & Cuyahoga Falls Division, Chamber of Commerce, 137 South Main Street, Akron, Ohio;

6. Letter dated April 30, 1959, to Hon. Warren G. Magnuson, from Jim Hairgrove, general manager, station KFRD, Post Office Box 832, Rosenberg, Tex.; and

7. The comments of the FCC on report of the Ad Hoc Advisory Committee on Allocations, dated January 6, 1960.

(The documents above referred to are as follows:)

CITY OF AKRON, OHIO,
June 5, 1959.

Hon. WARREN G. MAGNUSON,
Chairman, Senate Interstate Commerce Committee,
New Senate Office Building, Washington, D.C.

MY DEAR SENATOR: The Federal Communications Commission, I am informed, is now making a study of television allocations for the purpose of providing more competitive VHF channels. I urgently request that the Akron area be included in the study.

By making a competitive VHF channel available to WAKR–TV, which is now a UHF station and the only Akron television station, the FCC can insure genuine competition in northern Ohio, and at the same time rectify a situation that is unfair to the people of the Akron and Summit County area.

The only VHF stations now reaching the Akron area are three Cleveland VHF stations. These stations furnish no local public service to our area. WAKR–TV in Akron, on the other hand, has devoted its facilities unstintingly to public service on the widest possible scale. WAKR–TV has regularly given hours of time weekly to such public concerns as traffic safety, crime prevention, juvenile delinquency, recreation, public improvements, teenage activity, education, election coverage, and full and fair discussion of many other matters. It also furnishes complete and regular news coverage.

The Cleveland stations properly serve all of the communities in Cuyahoga County, since Cleveland is the head and center of that county. Similarly, the 500,000 people of Summit County look to Akron as the chief city of an area which is politically and economically independent of the Cleveland area.

The right of the Akron area to be served by a local VHF station will commend itself to your sense of fairness. The concept of public service as a duty enjoined upon television stations in return for the franchise granted by government is violated when stations rendering no local public service wholly

preempt the VHF channels of this area, to the exclusion of a local station contributing public service of a very high order. Because few television sets are equipped to receive UHF stations, a UHF station cannot effectively compete with VHF stations.

The reexamination of television allocations now being made by the FCC to provide for more competitive VHF channels should include Akron. The assignment of a competitive VHF channel to WAKR–TV will insure needed competition and correct the inequity I have described.

Very truly yours,

LEO BERG, *Mayor.*

AREA DEVELOPMENT COMMITTEE,
MEDINA, SUMMIT, AND PORTAGE COUNTIES,
Akron, Ohio, June 11, 1959.

Hon. WARREN G. MAGNUSON,
New Senate Office Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: There is real danger that those of us doing business and residing in the Akron area will become vassals to the colossus in the north, namely; the Cleveland area. For too long now we have been living in the shadows of the Cleveland complex. It is obvious from some of the decisions made, particularly by governmental units, that there is unawareness of a definite division of marketing areas, population concentration, etc., in northeastern Ohio.

It has come to our attention that the Federal Communications Commission at the present time is reexamining television channel allocations to provide more competitive VHF channels in certain areas. Up to this time, the Akron metropolitan area of over a half million persons has been denied a VHF station. As such, there is no public service time made available to this area. We have no right, nor should we expect, the existing Cleveland VHF stations to provide, at best, token service.

We are fortunate in having a progressive, alert UHF station. We recognize, as I am sure you do, that experience has proven a UHF station cannot compete successfully where multiple VHF stations are serving an area. Therefore, we feel WAKR should receive a VHF classification.

The primary function of the Area Development Committee is to attract new industry into the area of Summit, Portage, and Medina Counties. In the 5 years we have operated, WAKR has given our organization tremendous support by doing remote broadcasts on groundbreaking ceremonies, such as the ones for the $100 million General Motors Euclid Division plant and the $150 million Chrysler plant that located recently in Summit County. They have never failed to provide excellent coverage for any occasion, regardless of the cost involved.

The tricounty area that must look to WAKR for television coverage is destined for tremendous growth in the immediate years ahead. This is not merely idle chatter but is based on sound economic facts. The St. Lawrence Seaway, the completion of the North-South Freeway to connect the New York Thruway with the South, the Ohio Turnpike, etc., are all factors that will make growth in the area tremendous. It is important to us as an organization that Akron, the largest city in the Nation with its own metropolitan area not having a VHF channel assigned to it, receive its own VHF channel allocation.

If there should be any question as to whether or not Akron truly does have its own marketing area, we as an organization are quite anxious to support this contention with facts and figures.

Sincerely,

GEORGE E. WILSON, *Executive Director.*

AKRON LABOR COUNCIL,
Akron, Ohio, June 4, 1959.

Hon. WARREN G. MAGNUSON,
U.S. Senate, New Senate Office Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: We understand that the Federal Communications Commission is reexamining television channel allocations.

We of a metropolitan area of some 500,000 persons know there is a need for a VHF channel in Akron so that the public service for this community can have available a local public service.

We find that Akron is the largest city in the Nation with its own metropolitan area that does not have a VHF channel assigned to it.

Television through its availability for education is a must in these changing times. We in the Akron area are recommending a $42 million redevelopment program, and what better means do we have to acquaint the residents of the need for this program than by television. We have available at the present time only what Cleveland stations transmit, which has no value to our community programs. WAKR–TV has served this city for some 5 or 6 years on UHF channel which has its limitations.

We are asking that you give serious consideration for a VHF channel to WAKR–TV so that the residents of this area may enjoy the benefits of the public service of other communities of equal population.

We ask that you appear before the Federal Communications Commission in behalf of the residents of Akron and its metropolitan area for the purpose of a VHF channel so that such public service can be made available.

Yours respectfully,

LEO E. DUGAN, *Executive Secretary.*

AKRON PUBLIC SCHOOLS,
Akron Ohio, June 4, 1959.

Hon. WARREN G. MAGNUSON,
Chairman, Senate Interstate Commerce Committee,
New Senate Office Building, Washington, D.C.

DEAR SENATOR MAGNUSON: I understand that the Federal Communications Commission is engaged in a reexamination of television allocations, particularly the VHF channels.

The lack of a VHF station in Akron is a serious deterrent to the advancement of the cultural climate of the city. I refer to the potential force that such a station could bring to the educational and civic development of this city of 300,000 people. Being denied local services, the citizenry is forced to turn to another city which focuses its public-service time to the needs of that city. The Cleveland stations are easily accessible, but cannot serve these cultural, educational, and civic needs of Akron.

WAKR–TV has been very generous in granting time for educational programs, including credit courses presented by our evening high school. Unfortunately, the potential audience is limited due to the complications of reception for a UHF channel. Akron is an economic and cultural entity which cannot be served by Cleveland facilities. Such a fact is very evident in planning the educational responsibilities of the community.

An Akron VHF station with the same generous approach to educational services that have prevailed at WAKR would be a great boon to the improvement of the educational level of the city. Viewed from my experiences, it is urgent that this deficiency be corrected at an early date.

Your consideration in this important matter will be appreciated.

Cordially,

MARTIN ESSEX, *Superintendent of Schools.*

AKRON AND CUYAHOGA FALLS DIVISION,
CHAMBER OF COMMERCE,
Akron, Ohio, May 28, 1959.

Hon. WARREN G. MAGNUSON
Chairman, Senate Interstate Commerce Committee,
New Senate Office Building,
Washington, D.C.

DEAR MR. MAGNUSON: We again call upon you for assistance in a matter we feel is of vital importance to our community: that of establishing a VHF television channel in Akron, Ohio.

You are no doubt aware that the Federal Communications Commission is now reexamining television allocations to provide more competitive VHF channels in certain areas. It should be noted that Akron is not one of the 36 cities being considered. This letter is written in order that we may call your attention to the outstanding achievements brought about with the present WAKR–TV UHF outlet.

Speaking on the part of our organization alone, the local UHF outlet has been of tremendous value to us in bringing to the attention of local viewers the Akron Chamber of Commerce's program of work. Since early 1957 well over 600 public service minutes has been contributed by WAKR–TV in a regularly scheduled telecast entitled "A Report From Your Chamber of Commerce." This time does not include special telecast and interviews on important civic affairs, nor does it include the invaluable assistance to this organization in publcizing our endeavors by daily spot announcements.

We wish to point out that public service time on any of Akron's projects are not available to us from the Cleveland, Ohio, television outlets.

The fact that Akron's projected population figure for the year 1975 has been estimated to become over 388,000 certainly points up that Akron warrants improved and a more competitive television outlet.

On behalf of the Akron Chamber of Commerce, its over 1,850 members and entire community we respectfully request your assistance in strongly urging that a competitive VHF channel be immediately made available to WAKR–TV. This will assure that the local public service programs this organization and the Akron area has enjoyed for the past 6 years will still be available.

We are sure that you will make every effort to bring this request to a successfully and rewarding conclusion.

Respectfully,

GEO. WM. BRITTAIN, *Executive Secretary.*

KFRD 980, FORT BEND BROADCASTING CO., INC.,
Rosenberg, Tex., April 30, 1959.

Senator WARREN G. MAGNUSON,
Senate Office Building,
Washington, D.C.

DEAR SENATOR MAGNUSON: This letter is written in reference to the recent Federal Communications Commission report on television allocations for this country.

Although I represent a small radio station in a small market, I feel that this matter is of the utmost importance to every community outside of metropolitan areas in the United States; therefore, I would respectfully request that the following brief suggestions be called to the committees attention:

1. It is amost an utter technical impossibility to increase present television service in the United States with the present VHF television system.
2. It has been proven, except in isolated cases, that a UHF television station cannot exist in competition with an established VHF station or stations.
3. Regardless of what system is finally decided upon, it would not seem to be fair or legal for that matter, to force manufacturers to build special receivers to cover a special band or frequencies. The matter will have to evolve from simple economics, i.e., the law of supply and demand.
4. I feel that the only way that every community in the United States will receive adequate local television service, is through the proposal submitted by Federal Communications Commissioner Robert E. Lee. His proposal, as you know, is to move all television to the UHF band with a transition period of 5 to 7 years. This, sir, in my opinion, is the only logical and workable method to use in order to assure a complete nationwide system. After all, we feel that it is the obligation of Congress and the various agencies of the Government to serve all the people and not just a privileged few.

Thank you for your kind attention.

Sincerely.

JIM HAIRGROVE, *General Manager.*

COMMENTS OF FEDERAL COMMUNICATIONS COMMISSION ON REPORT OF THE AD HOC ADVISORY COMMITTEE ON ALLOCATIONS (BOWLES REPORT) TO THE SENATE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE

The Federal Communications Commission comments as follows with reference to the four recommendations presented by the Bowles report.

I. AN INDEPENDENT AUDIT OF THE UHF-VHF ALLOCATIONS PROBLEM

The first recommendation of the ad hoc committee calls for an independent audit of the UHF-VHF allocations problem to be conducted by a nationally recognized professional institution for the purpose of giving the Commission "a considered, comprehensive analysis of the national television problem with detailed recommendations with respect to a nationwide allocations plan." The period of the audit should be flexible, with a minimum of 1 year and a maximum of 3 years, and it is recommended that a minimum budget of $500,000 be set aside to insure initiation of the project. The report points out that a nationwide plan involves considerations covering a vast area including economics, social objectives, political aspects, and technical factors. Among the factors to be considered are listed the following: What comprises tolerable interference and permissible station spacing, the need for higher power UHF transmitters and lower gain antennas, the need for more adequate input tubes for UHF receivers, the means of promoting greater research and development efforts, the questions of high-tower potentialities and directional antenna arrays, methods of carrier stabilization and their effect upon station density, the advantages and disadvantages of drop-ins, the quandary of boosters, satellites, and translators, the place of networks, the requirements of coaxial and microwave link transmission facilities, the place of closed circuit television, the implications of pay television, and a realistic evaluation of the economic, social, and technical factors affecting the growth of television broadcasting, including community television.

The Commission has no disagreement with the enumeration of the factors to be considered. It has in fact been gathering pertinent data relating to most of the enumerated areas by means of formal proceedings and informal staff studies over the years. In view of the foregoing and other developments, it is doubtful that an independent audit would provide any new meaningful assistance to the Commission. The report does not indicate in what way an independent audit of these technical factors would differ from the Commission's study of them. On the other hand, although criticizing the Commission for its dependence on industrial and professional committees, the report (p. 249) indicates that the work of the TASO group (an industrial and professional group enlisted by the Commission) on propagation should be of immense assistance to the audit group and could readily be coordinated therewith. Therefore, since any such audit would have to rely principally, if not entirely, upon the same sources of information as the Commission does, it is not apparent why an independent study would produce substantially different data or conclusions than Commission-conducted studies.

Moreover, as indicated in the statement made to your committee in April 1959, the Commission and its staff has been intensively studying the television allocations problem since its appearance before your committee in May 1958, and that it recently had received the report of TASO for consideration in further deliberations. We then indicated that five alternative television systems had been studied and stated that, before the Commission can finally agree on one of the alternatives, it must ascertain whether a wholesale reallocation of VHF spectrum space would be feasible and in the public interest. Expansion of television in the VHF would require use of radiofrequency bands now largely allocated to and occupied by Government services, mostly military. The Com-

mission, together with the Government agencies involved, has been vigorously engaged in an accelerated program to ascertain whether it is feasible to look to such expansion of TV in the VHF. This program is part of a long-range frequency allocation study being jointly carried on by the FCC and the other agencies. This study involves the technical problems, costs, and evaluation of the feasibility from these standpoints of the changes which would necessarily be made in the frequency band 50 to 1,000 megacycles, if such a reallocation were to be made. It is expected that the Commission will soon be in a position to evaluate this study which is indispensable to any solution of the UHF-VHF problem.

II. AN OBJECTIVE REVIEW OF THE COMMISSION'S MANDATE, MANAGEMENT, OPERATION, AND BUDGET

The second recommendation suggests that a "group be selected under the leadership of a distinguished, public spirited, highly qualified citizen to examine the Commission's mandate under the Communications Act, its organization, budget, and management, to determine what steps are necessary in order that it can discharge its varied responsibilities with the utmost efficiency and greatest benefit to the public." It is the Commission's view that this precise function is carried out regularly not only by this committee but by other committees of the Senate and House as well. Whether any further detailed studies of the objectives of the Communications Act of 1934, as amended, are required to further promote the public interest is a matter solely within the discretion of Congress.

III. THE ESTABLISHMENT OF A COMMUNICATIONS OFFICE OR AUTHORITY AS PART OF THE EXECUTIVE STRUCTURE

IV. AN AUTHORITATIVE CLASSIFIED REVIEW OF THE RADIO SPECTRUM REQUIREMENTS OF THE NATION AS A WHOLE, CONDUCTED AT EXECUTIVE LEVEL

The third and fourth recommendations are so related that they may appropriately be grouped for discussion. The third recommendation calls for an executive agency to resolve conflicts as to allocations between not only governmental users but also conflicts between governmental and nongovernmental users. The fourth recommendation is for a survey at Presidential level of the radio spectrum in terms of governmental and nongovernmental needs. The Commission is in full accord with the objectives of these recommendations, and the only area of difference among the individual Commissioners is the mechanics of accomplishing the objectives, e.g., whether the communications authority and the spectrum survey should be under the supervision of the executive or legislative branch. However, inasmuch as the broad objectives are the subject of numerous pending bills in the Senate and the House, we deem it more appropriate to reserve more specific comments until further study of the various legislative proposals.

Senator PASTORE. That is the opening statement of the chairman, and if there are any opening remarks the members of the subcommittee desire to make, I defer to them at this time. Mr. Cotton.

Senator COTTON. I would just like to compliment the chairman on the clarity and forthrightness of his statement. Speaking as one of the minority members of this committee, I would like to say that I join most heartily in his expression and his hope that, in ordinary parlance, in these hearings we are going to get down to brass tacks.

Senator PASTORE. I hope so. Mr. Lausche? Mr. Thurmond?

Senator THURMOND. Mr. Chairman, I want to say that my interest is that of the public. I hope that this matter can be gone into very thoroughly.

I understand that there is a Government-sponsored industry committee now, which is to report on April 19; and before action is taken, decisions which might be precedents in future cases, I hope the Com-

mission will be very careful not to set some precedent that might be binding and that might harm some segment of the population in the future.

I certainly want to see the best service in every city of the United States, and at the same time I want to see our rural population protected, too.

Senator PASTORE. Does that conclude your opening statement?

Senator THURMOND. Yes.

Senator PASTORE. Mr. Monroney, we have each of us been making an opening statement. If you desire to make one at this time you may do so.

Senator MONRONEY. May I reserve it for the record later?

Senator PASTORE. Yes.

In other words, gentlemen, I hope this does not result in an exercise in futility. We are all very busy people. You are, and we are. We know how difficult this problem is. We approach it without criticism. We approach it understandingly. But you are a Commission that has marched up the hill by vote of 4 to 3 and marched back again by the same vote of 4 to 3.

I hope that along the line you have come along with some definitive answer so that the American public that is interested in this business will know what action we are taking. It is as simple as that, and if it is a dismal complete failure, just stand up like honest people and say so. I think it will be more effective than all this dillydallying that has gone on for long years, 6 years.

Tell us, please, what is the future of UHF. Tell us, please, what is the future of VHF. Tell us, please, how we are going to have a national competitive television situation, or is UHF going to die on the vine. This is as simple as it is.

We will hear first from our distinguished visitor from Ohio, Congressman Ayres.

STATEMENT OF HON. WILLIAM HANES AYRES, REPRESENTATIVE IN CONGRESS FROM THE 14TH DISTRICT OF THE STATE OF OHIO

Mr. AYRES. Thank you, Mr. Chairman.

I want to join with the Senators who commented on the clearcut manner in which you have stated the case in your opening statement. I can see that you are very familiar with the problem.

Our situation, in Ohio, Mr. Chairman, briefly, is this. I represent the city of Akron, with a metropolitan area of nearly 600,000 people. We are roughly 33 miles from Cleveland, Ohio, where there are three VHF channels.

Seven years ago, Mr. Bernard Berk, through the advice and consent—and, to a degree, the recommendation—of the Commission, established a UHF channel in Akron. For the past 7 years he has been consistent in one thing, and that is that he has lost money in every year. He has now reached the point where he has lost over a million dollars trying to make a go of this UHF channel.

As you know, the Commission is now considering locating more VHF channels. There are being considered in the State of Ohio.

The people of Akron, in order to even view the UHF station, have had to pay about $50 for a converter. A good percentage of the sets have been converted, but it is impossible for the station to operate at a profit because our local merchants do not get the complete coverage that the Cleveland merchants do; and our local people cannot afford to pay for the Cleveland market, when those people would not be participating in our market area.

The management has been more than fair with the community in providing public service programs—church programs, school programs, athletic events by our university. In fact, the Akron Labor Council has tried to help out and had a program on the station.

Briefly, Mr. Chairman, I know that you are familiar with it, because you had a similar situation in your home area.

Now, after almost 7 years, with the station having given the best possible service under the circumstances that it could, having lost the money that they have, and because of the deterioration and the lack of clarification by the Commission—and I do not wish to be critical of them, but all Mr. Berk and the city of Akron have had for 7 years are promises, promises, promises.

Now he has reached the point where he has to make a decision either to close out because of the national deterioration of UHF, and his being in this most unusual situation, if he does that, then Akron will have no television.

In my judgment—not being a technician, Mr. Chairman, but having talked with technicians in this field—I am convinced that Akron could have a VHF channel without interfering with the entire operation. And I think it is most unfair for the Commission to consider the allocation of additional V's where there are already two V's in those areas, and that is exactly what they are doing in the Akron situation.

Senator PASTORE. Where are these cities with two V's located with reference to Akron?

Mr. AYRES. The new ones that they are speaking of, one is in Dayton—

Senator PASTORE. Let me ask it in this fashion, Mr. Ayres. The people of Akron have the availability of how many channels?

Mr. AYRES. They have the availability of three channels out of Cleveland.

Senator PASTORE. Out of Cleveland?

Mr. AYRES. Yes. None out of Akron. And the Commission is considering another V for the Steubenville area, Senator Lausche; another V for the Dayton area; and another V for the Toledo area—and each of those already has two V's.

Senator COTTON. Each of them has two?

Mr. AYRES. Each of them already has two V's.

Senator PASTORE. Can the people of Akron readily see the TV channels that come over from Cleveland and these other parts?

Mr. AYRES. Yes, very good. That is the reason it makes it so difficult to have a UHF station. The UHF just cannot compete with those three V's out of Cleveland.

Senator PASTORE. But they have no local programing because it all originates distantly from Akron. Is that the point you make?

Mr. AYRES. The programs originating in Akron are the only ones of a local public service nature.

Senator PASTORE. Would you say this man you have mentioned is holding on in the hope he can get a V channel himself?

Mr. AYRES. He has been advised for the last 4 years by the Commission that they were working on something that would help his situation.

Senator COTTON. May I ask a question?

Senator PASTORE. Yes, Mr. Cotton.

Senator COTTON. The situation is what it is because of the fact that that to even get reception of your U channel in Akron each person with a television set has to go to expense of $50 for a converter. And that means that your station reaches very, very few people because comparatively few people will spend $50 to get a local station when they are getting perfectly good reception from Cleveland?

Mr. AYRES. About the only time we have ever really been able to sell converters is when some parents' boy was playing in a football game that afternoon and they paid the $50 to see the game.

Senator COTTON. So that the merchants of Akron, if they desire to advertise, have to pay Cleveland rates and get on the Cleveland V, and it is a waste of money for them to advertise over the U station in Akron, and that is the reason the U station cannot make both ends meet?

Mr. AYRES. You have pinpointed it very well. And, of course, when Senator Lausche gives a speech out of Cleveland, we all listen to it in Akron.

Senator COTTON. By the same token, when you are running for Congress you have to buy space in Cleveland. Is that right?

Mr. AYRES. And two million people hear it who can't vote for me. [Laughter.]

Senator MONRONEY. Does the UHF station have a network affiliation?

Mr. AYRES. No.*

Senator MONRONEY. Are you able to sell any national advertisers?

Mr. AYRES. None whatsoever, Senator.

Senator MONRONEY. The door is locked. This is a U station that is just out of the window.

Mr. AYRES. That is right.

Senator MONRONEY. So that you are clipped both on your public service—that is, on the service that you offer to the public—and behind that you have got a complete blockage against a hope of revenue, because you happen to carry the UHF brand.

Mr. AYRES. You have pinpointed it very well.

Senator PASTORE. Senator Thurmond, we will take your comments and leave Senator Lausche till last, if you don't mind. (Senator Thurmond indicated he had no question.)

*See a letter from Congressman Ayres on this point which was inserted in the record at the close of the hearing on Feb. 4, 1960.

Senator LAUSCHE. In 1957 when I came into the Senate, I sat in on hearings that we conducted. At that time Mr. Berk testified, and he came to see me personally. From that time on, down to this day, he has been telling me of the moneys that he has been losing . I take him at his word, that that is the fact. And he, in substance, related what Congressman Ayres has told this committee, that he was anticipating a solution where, with his station losing money in Akron, he could in some way neutralize the damaging impact that the three competitors with the V stations in Cleveland were giving him.

This station in Akron has been rendering a good public service, and while I am on that score, I want to say something about public service. I might as well say it now.

I understand that last Saturday night a Washington station showed a picture of a married woman in illicit relation with a teenage boy. It did not show the picture of the actual relation, but they went so far as showing them entering a bed. I just cannot help but become indignant when I hear about serving the public interest, and self-control and self-policing, and then to understand that pictures of that type are being shown.

Last week we made the declaration that we are going to fight juvenile delinquency, and in that very same week television stations which are preaching about the increase in the number of juvenile delinquents are showing pictures, that go into the home, of a married woman inducing a teenage boy and finally getting him into bed.

Well, anyhow——

Mr. AYRES. Well, I think, Senator, if you will yield——

Senator LAUSCHE. Pardon me for digressing.

Mr. AYRES. Mr. Berk and the whole management of the station, as you know, have been most cooperative with our various religious organizations of all faiths. We have had an hour's program donated every Sunday. In fact, Mr. Berk's is the only station there that has religious programs on daily.

Senator LAUSCHE. Well, tragically, the station of which I speak probably has had religious programs on it. But that makes the travesty all the worse. In the one moment speaking about the development of the moral character of the youth of our country, and in the next moment defiling them and contaminating them. And I wonder what this Commission is going to do about these things.

Some few men have fallen victim to the deceptions that have been practiced—innocent fools—but the ones who made the money have gone unscathed and untouched.

Now, I don't know on what basis Toledo, Dayton, and Steubenville were chosen. Steubenville does not have two stations, does it? Do they have two now?

Mr. AYRES. Yes.

Senator LAUSCHE. And this will give them a third?

Mr. AYRES. That is irght.

Senator LAUSCHE. And Dayton has two, and this will give them a third, and so has Toledo.

I do not know what the scientific approach to it is, or why they have been chosen. It does seem that there is strength in what you say, at what you call a first impression, why, when there are two, a third is given, unless there is good scientific reason for it.

Go ahead.

Mr. AYRES. I think there is good business reason for wanting the channel on the part of the network that is not now represented in that area. I think, Senator, it is as simple as that.

Senator LAUSCHE. Well, that same condition is in existence in your area and you are not being granted one.

Mr. AYRES. That is absolutely right.

Senator LAUSCHE. I am not going to pass on the merits of the claims of Toledo and Steubenville and Dayton, except to say that, prima facie, the statement which you make seems to have some validity, and unless it can be rebutted by strong scientific proof, you have got to give it some consideration.

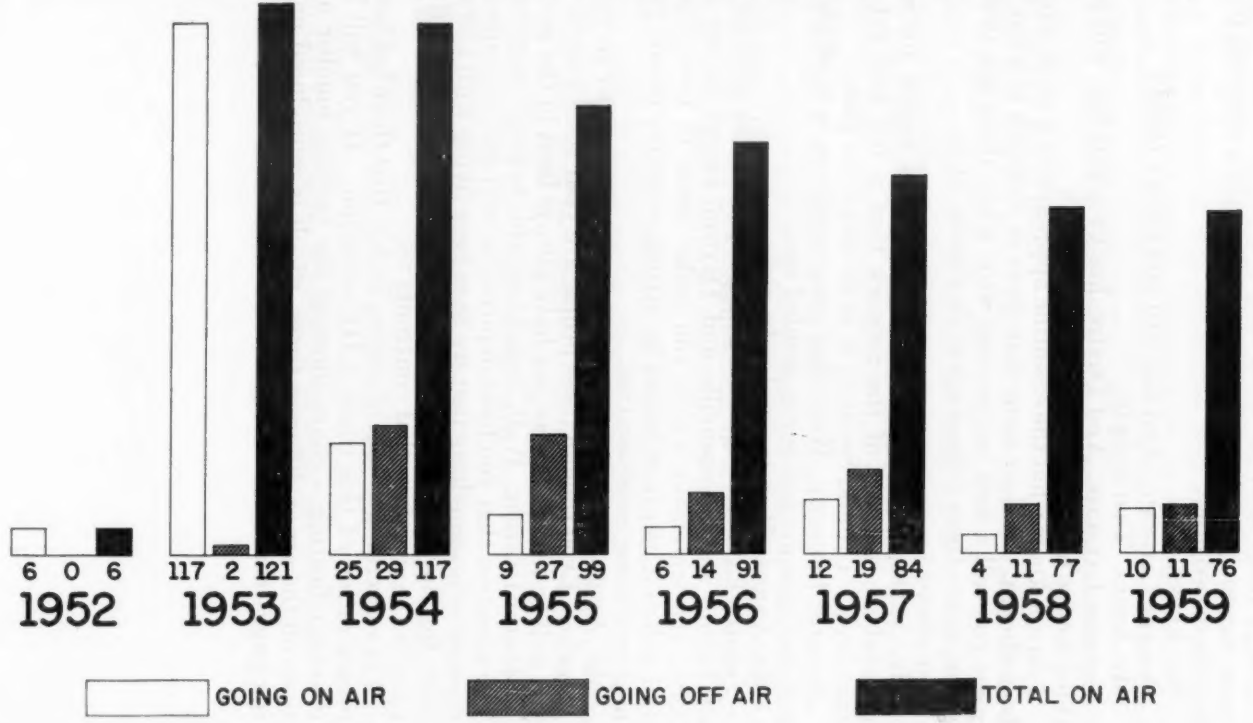
Mr. AYRES. I would like to say this, in regard to you, Senator Lausche. Even though those people are your constituents, too, I know you will be just as fair as you have always been in the past.

Senator PASTORE. Well, I might say this to you, Congressman Ayres. The situation that you have depicted so well and so eloquently for this committee is something that we have been living with and are familiar with for the past 6 years. It only points up again and emphasizes exactly the situation that confronts us.

The regrettable thing, of course, is this: that there has been a gradual deterioration of this whole UHF situation. If you will look at that chart [indicating a chart showing the varying number of UHF stations on the air at different times, which is reproduced on the following page] that chart brings it out rather graphically.

NUMBER OF UHF TV STATIONS IN OPERATION

JULY, 1952 THRU DECEMBER, 1959



We start out, I think, with 172 UHF stations which have gone on the air at some time. The column showing 121, that was the total that was on the air, the highest at any time. Now we come down to 76 at the end of 1959. You see the picture. It comes down and gets smaller and smaller and smaller, and more and more of them are going off the air.

I think from the economic standpoint the situation would even be worse than the 76, but for the fact that some of these fellows are holding out for dear life, hoping they can get themselves a VHF permit.

Mr. AYRES. Does that chart, Senator, include only the areas covered by UHF?

Senator PASTORE. There is also the map, there, of the United States [indicating]. Those red disks are the UHF stations that have gone off the air. The red half moons are permits that have not gone into construction. The blues are those that are on the air now.

Now, you can see there exactly what has been happening in this field. I think this problem has become even bigger than the individual operator. The big problem now is what is ultimately going to happen to this band of 70 channels, on UHF.

If these stations are gradually going to die, then the big question is what becomes of the UHF band entirely, and what is the answer to this whole problem.

Along the line, I think somebody has to stand up and give a definitive answer. I think the public is entitled to it. That is what we are up against.

The situation you give us here on this morning of February 2, 1960, is nothing more than what the junior Senator from Rhode Island heard 5 or 6 years ago.

Mr. AYRES. You have had the same problem.

Senator MONRONEY. Why don't we put in the record at this point the fundamental fact of life: How many of these 76 still on the air have network affiliations.[1]

You are not going to exist if there is a perpetual, continuous boycott by the networks of anybody who carries the scarlet "U", you might say, because they are not going to put them on.

Senator PASTORE. I don't know how critical you can be of the networks. After all, they want to make the best economic deal they can. They have gone so far as to buy these UHF stations, but then abandoned them or sold them out.

The big question here is the responsibility of the Commission itself. What is it going to do? There must be an answer to all this, and if we have to get down to the alternative of moving against the networks so they will be tied up with contracts, I don't know how you are ever going to do that by legislation.

---

[1] According to Television Fact Book, all but four of the UHF stations still on the air have some sort of network affiliation. These four are the only UHF stations still operating in four station markets, indicating that under such circumstances a UHF station stands little or no competitive chance to acquire and hold a network affiliation. Most of the remaining stations are either in all-UHF areas, where they can therefore compete equally for network affiliation, or are in smaller communities having one or two stations with some overshadowing VHF service. Except in the all-UHF markets, there is a good deal in the record before the committee to suggest that network revenues do not play a very substantial part in the operation of small UHF stations. Earlier hearings before the committee made clear the difficulties encountered by UHF stations in trying to win network affiliation in competition with VHF stations.

But here there is tremendous public responsibility, and what we are interested in is how the public is going to fare in all this complex and involved situation. What are the people in Akron, Ohio, going to do about a local station. When they run a school committee election, do they have to go to Cleveland and buy that expensive time and reach 2 million people who are not interested in their school committee election in order to reach just the people who are in Akron? What is going to happen to local broadcasting? What is going to happen to free television?

We have VHF television moving in in some parts of the country, and that is only because there has been a failure right down the line.

National broadcasting is not on a competitive basis. We understand that. Those who hit the jackpot and got themselves a V, and found a VHF license in a good community, hit the pot of gold. And then you have the small fellow in a community like Akron, Ohio, who is trying to do a public service, and he is losing a million dollars.

Somewhere along the line someone in responsibility has got to stand up and say, "You had better get out of business because you are not going to exist, or you had better get a V station."

We have to solve this problem. I know 5 years ago I was assured that by June of that year they would have an answer. That was about 5 years ago. The man who made the promise is not with the Commission any more. [Laughter.] That is what happens every time. They either change the vote or change the personalities, but they never come up with the solution.

Our first witness is the Chairman of this illustrious Commission, Mr. John Doerfer. And we would appreciate it very much if all of the Commissioners who are here would grace the witness table.

Let me say how pleased I am to see the whole Commission here today. I repeat again, we approach this with no sense of criticism, and while our language may appear strong at moments, that is only because we have experienced over the past 5 or 6 years—and maybe you are in the same predicament that we are.

As we proceed, we said we would talk about tangibles, we would talk about definite problems, and we would talk about more or less definitive solutions. I would hope when we get through with these hearings we would have some good idea what direction we will take in this whole involved field. Mr. Doerfer.

STATEMENT OF JOHN C. DOERFER, CHAIRMAN, FEDERAL COMMUNICATIONS COMMISSION; ACCOMPANIED BY COMMISSIONERS FREDERICK W. FORD, ROSEL H. HYDE, T. A. M. CRAVEN, JOHN S. CROSS, ROBERT E. LEE, AND ROBERT T. BARTLEY

Mr. DOERFER. Mr. Chairman, and members of the committee, I have a statement which I think, if I can give it in full, will probably explain a good deal of the difficulties.

I would like, however, at the very outset to indicate that some of the statements which were made on the basis of information which is not correct.

Senator PASTORE. Statements made by whom?

Mr. DOERFER. I think the statement made by Congressman Ayres that we were contemplating putting in three V's in Steubenville-Wheeling, and in Toledo and Dayton, Ohio, if I understood him correctly, is not true. I understand that there was a petition filed at one time, but that had been denied, along with the Akron petition.

I would like at the outset also to correct another impression, and that is that the fact that a city the size of Akron does not have a local television station is not necessarily the result of the failure of the Federal Communications Commission to provide it with a VHF service.

I might point out that a market equally as large, if not larger than Akron, has a V, and has gone off the air for reasons other than the technical aspects of the television service. I refer to Wilmington, Del.

An experienced broadcaster undertook to light up that station, a VHF station; but because it was under the shadow of Philadelphia, he could not make a go of it, with the result that he lost an awful lot of money and did not even sell it, but turned it back to the Commission.

I would say that Akron's troubles are essentially of the same kind. It is overshadowed by Cleveland. I was surprised to hear that Akron is 33 miles from Cleveland. I thought it was 25, according to the evidence in the proceedings which we undertook at one time to consider the shifting of some channels, and all we did was open up a Pandora's box.

I think the reading of that record would substantiate my original misgivings, as you know.

Senator PASTORE. Yes, John, but will you admit this: That is the reason why we always get confused here, because we seem to talk in a circle. Are you saying now that the situation in Akron, Ohio, would have been the same if that same UHF station were a V?

Mr. DOERFER. I suspect it would.

Senator PASTORE. Well, why do you say that?

Mr. DOERFER. Because it seems that a successful operation must have a network affiliation. I do not think any network—or let us put it this way: The advertisers would not buy both Akron and Cleveland, when Akron is covered 100 percent. All of the people in Akron, in the Akron metropolitan area, can receive the Cleveland signals just about as well as they could if they had a transmitter at the Akron site. As a matter of fact——

Senator PASTORE. Are you not proving, actually, that the stations in Cleveland may be too strong, and cover too much of an area, in violation of this concept of local service—that you have to go as far as you can in making it so, a local contribution to the welfare of a community?

I mean, the point is this: Every time you have come here you have said that this would happen no matter what the station was, whether it was UHF or VHF, and we are always dealing with imponderables. "Something did it, but we don't know what did it."

But how do you explain that chart? [Indicating] Here is the chart we have here. The green represents the total stations on the air at the end of each year. In 1953, we had 121 UHF stations on the air. In 1954, we had 117; in 1955, 99; in 1956, 91; in 1957, 84; in 1958, 77; and now it is 76.

There has been a gradual downward trend, and as this thing gets worse and worse and worse, and with the vicissitudes of time, naturally the 76 figure may be dropped down to a smaller figure, or possibly to the complete blackout of UHF. And yet you keep coming up here and saying it is not the fault of UHF. "UHF is a good thing. It is only because of the economic situation."

Now, how can we keep saying that?

Mr. DOERFER. Well, Senator, I have never said that, as you know.

Senator PASTORE. Are you saying now this U station in Akron, Ohio, would have lost money even if it were a V?

Mr. DOERFER. That is right.

But that has nothing to do with the technical aspects of the V signal. What I am trying to say is two things. One, that the economics of the station are most important for sustaining the station, regardless of whether it is a V or a U.

That chart that you pointed to is the result of a miscalculation, not only on the part of the Federal Communications Commission in 1952, but the entire industry, save a few, including the networks, who warned the Federal Communications Commission that you cannot intermix, or should not intermix. But they were suspect. They were big business. There was something about it that did not take. As a result, they listened to the other people who ventured, and who didn't know that this thing was going to happen, and that is why you have the situation that is going to happen today.

Senator PASTORE. Are you telling me that UHF is going to die?

Mr. DOERFER. No, I am not prepared to say that.

Senator PASTORE. Well, how far can you go?

Mr. DOERFER. I would say you cannot force life into it by a governmental agency or on congressional mandate. It is going to cost the people of this country $2½ billion to convert to UHF, and I am not prepared to come up and recommend to Congress that we do it that way. And I am certainly not prepared to recommend to the Commission they embark on such an enterprise.

Senator PASTORE. Are you recommending that we stand still in regard to this intermixture and just let time take its course; and if these stations are going to die, let them die and forget the 70 bands on UHF?

Why don't you give me a clear answer?

Mr. DOERFER. The only clear answer I can give you is that the people of this country will not accept what we have offered to them. I don't know why. You can't change the laws of nature. You can't bend the UHF signals around a corner or around a valley. You can't really change human nature. The people don't want it. It is not that the FCC would not be more than happy to solve this problem.

Senator PASTORE. Well, you had an all-UHF section—you had it in Hartford—but you insisted on putting a V in there, and the V took over the UHF; and then it got into an intermixed situation and UHF goes down, and the networks, which owned the UHF stations, are out completely.

Why do you keep saying the people won't accept it? It is some of the things you have done, too. You had an all-UHF section and you allowed a V license to go in; and the minute the V's went in, grad-

ually there was a confusion, and then after that there was dismal failure. That happened in several points.

Mr. DOERFER. You are talking now about selective deintermixture.

Senator PASTORE. I am talking of where you had UHF and let a V in, and the two apparently can't live in the same section at the same time.

Mr. DOERFER. Well, at this particular stage of development that is true.

Senator PASTORE. And you, as the Chairman of the Commission, have always been opposed to deintermixture. Am I wrong about that?

Mr. DOERFER. That is right. Because I think the experience has demonstrated that you will either have an intermixture or it will be much longer than the 5 or 10 years, even if you passed a law today requiring everybody to convert to UHF.

Senator PASTORE. Mr. Cox has a few points he wants to bring out. I think he should at this time.

Mr. DOERFER. I wanted to complete just one aspect.

Senator PASTORE. Go ahead.

Mr. DOERFER. The deintermixture—the Hartford situation.

I concur with the one objective, and the first objective, that everybody in this country should, if possible, receive at least one television service. I think that the only way you can do it is by the employment of both V's and U's. Some markets are too sparse to support a small operation. It has got to have wide coverage, and it has got to be penetrating enough to fill the shadows.

I do not think that you can deintermix. I think if this committee would take the time to watch these slides, and try to understand that once you start this peeling back process there is no end. That is clear. This is not taking a little bit of a market, and transposing it into a U. When you do that, you take fringe service away from the rural people. I do not know how many millions of people would be without service. I suspect it would run into substantial figures.

It is one thing to plan ahead of time, like they did in Fort Wayne and in some of these other communities, where the people have adjusted themselves. It is another to obsolete millions of sets in the hands of people who need the service perhaps more than they do in the urban areas. That is our problem.

Senator PASTORE. All right. Let me ask you—Bob Lee, you don't agree with that, do you?

Mr. LEE. No; I do not.

Senator PASTORE. And that is what we are up against. [Laughter]

Mr. Cox. Mr. Doerfer, you suggested first, with reference to Congressman Ayres' testimony, that the Commission is not considering adding a third V in Dayton, Toledo, and Steubenville; but the Commission is presently embarked on a rulemaking proceeding looking to the possibility of accepting petitions for waiving minimum separations, is it not?

Mr. DOERFER. Yes.

Mr. Cox. Is it not true that the avowed purpose of this—a condition set up to govern this—is to provide an additional VHF service in markets now having one or two VHF services?

Mr. DOERFER. Yes; we can, under the circumstances and conditions set forth.

Mr. COX. And if any additional V's were to be granted in Ohio, under the terms of that pending proceeding, these would be the communities which would meet the specifications that you set up in your announcement of your rulemaking. Is that not true?

Mr. DOERFER. Well, I think we would attempt to pattern the technical specifications or reductions so that it would be quite possible to relieve the competitive inequalities in some of the major markets. There is nothing that I can see will ever solve the situation in Toledo. It is just within the shadow of Detroit.

There are some communities in this country that are so close to the larger metropolitan units that it will be a long time before that local community will support a television service.

Mr. COX. Do you mean that Toledo is not making money, the two stations that are already there?

Mr. DOERFER. Indeed they are. But I cannot find any way we can get a third V in there.

Mr. COX. That is an engineering problem based upon the maintenance or near maintenance, of the existing separations?

Mr. DOERFER. Well, let us take Akron. If we wanted to get a V in Akron, we would have to have it reduce its power, I don't know to what extent, and then run the risk of interference to any number of services on the periphery of this particular channel, whichever one we drop into Akron.

You cannot reduce, for illustration, the power of the three stations in Cleveland to permit a competitive outlet in Akron, without taking service away from hundreds of thousands or millions of people.

Mr. COX. You said you thought perhaps the problem in Akron was not a UHF-VHF problem. You cite the illustration of the Wilmington station. Is this not true: Mr. Storer's difficulty in operating the Wilmington station was that he tried to operate it as a Philadelphia station, that he moved his transmitter toward Philadelphia, that he had a problem with his signal, because the antenna orientation of the homes in Philadelphia was not proper for his purposes, and that the costs of his programing, based upon a Philadelphia market, were high? Is that not the case—that he attempted to operate this station as a station serving both Wilmington and Philadelphia?

Mr. DOERFER. I would like to answer that by stating that if he had tried to operate it as a purely local Wilmington station, he would have been out of business much sooner than he did go out of business.

Mr. COX. How about the people who operated the station before he bought it? Would you say they consistently lost money during the years they operated it?

Mr. DOERFER. I think they did. I don't know.

Mr. COX. There are two applicants for the channel in Wilmington now, are there not?

Mr. DOERFER. I think there are.

Mr. COX. Indicating, without the problem of compatibility in attempting to serve the local market, that there is an opening for a VHF station in Wilmington, Del.?

Mr. DOERFER. I think that is true, and I think that is typical of American business. Some people see an opportunity where others got burnt, and some make a go of it.

Mr. COX. You seem to say a VHF station cannot survive in an overshadowed area.

Mr. DOERFER. I did not say that. I say it is most improbable.

Mr. COX. Most improbable?

Mr. DOERFER. Today.

Mr. COX. Why is the Commission undertaking, or even considering, the major reallocation that would be necessary in order to obtain 50 VHF channels in order to put VHF channels in the local market, if in your view they are foredoomed to economic failure?

Mr. DOERFER. I think this, Mr. Cox, that the objective of the Commission, and one of its duties, is to provide as much service as it possibly can, without undue dislocations and disruptions. Whether or not they take, really cannot be laid on the doorstep of the FCC. It does not have control over the economic forces which impel the success of some stations and the failure of others.

Mr. COX. I don't think the operator in Akron is asking for any assurance he will make a profit. What he is asking is that he be given a facility which will have equal access to the sets in his area, so that he can provide—not Cleveland service, not to make profits based upon Cleveland's population—but so that he can provide a local service which will be fully effective and give him a reasonable chance of breaking even economically.

I understand the Commission's purposes in trying to get as much as 5 channels available for the major markets of the country and at least 1 channel for every community having a population of 35,000, in a county with a population of 50,000, is simply to make that opportunity available. No one expects it to guarantee success. But if you are so convinced, even in a market the size of Akron—which is in the top 50 markets in the country—that a local station cannot succeed, so it is, as the chairman suggests, an exercise in futility. Why bother to put these channels there in the first place?

Mr. DOERFER. I am not as pessimistic as to indicate this will be the condition for all time. But I am trying to highlight the fact that even with a V he will have a substantial competitive difficulty, being in the shadow of the competitive Cleveland stations. Whether that will be a development for tomorrow or not, I don't know.

I think the Commission should be encouraged to try to get as many facilities as possible on the air, provided it does not cause undue dislocation to the many millions of people who would lose the service. Akron is only part of the problem.

Senator MONRONEY. Mr. Chairman, may I ask a question?

It is never the Commission's concern, or this committee's concern, about the economic chances of success. You merely try to manage the placing of these allocations of wavelengths where they will not interfere electronically with other stations, as I understand the FCC's duty. If we go into the economics, whether station A will interfere with station B, we are lost in an impossible morass. But I think if we could open up these channels, then the entrepreneurs who are going to risk their money will have to take their chances. And that is not

a matter for the FCC to ask about when they file their application for a station, is it?

Mr. DOERFER. Well, no. I think it is grounded on two fundamental premises: One is that the Congress intended this entire development to be in the competitive area, within a system of our competitive enterprise concepts. And the second is this: We are trying to get as much service as we can to all of the people. These fringe areas will not support even a UHF station. That is why these stations go dark. Many of them opened up where the territory was not sufficiently productive to support them.

I cannot really see where, at this particular moment, the Commission should undertake to tear away service from millions of people, when we know one thing: The most outstanding thing in this discussion is that the complaint with respect to the UHF and the lack of service has not come from the people. I have not got any from John Q. Public. It is mostly some industry people who are anxious to get going and get started, and I don't blame them. If I could help them, I would do so, and so would all the other Commissioners.

This thing got started in 1952. I don't know whether it got off on the wrong foot or not. I don't know why people won't spend more that $50 to get two services. I don't know why they are satisfied with one service. But that seems to be the fact.

Senator PASTORE. How many complaints did you get from John Q. Public on the quiz scandals before they were investigated?

Mr. DOERFER. I don't remember any at all.

Senator PASTORE. And yet we had a scandal. I don't think we can gage it that way. The mere fact that you didn't get a letter from the public does not remove us from our public responsibility.

We are acting on the floor of the Senate every day, and you may not have any mail on it, but we have a problem that is facing the country that we recognize.

The point you make is that the public has not said anything, so we don't have a problem. Have we wasted 6 years, if that is true?

Mr. DOERFER. I agree with that, Senator; but the pubic has spoken with more than letters. It just has refused where we offered it to them.

Mr. COX. It has not refused it in Fort Wayne or Wilkes-Barre or in areas——

Mr. DOERFER. That is right.

Mr. COX. Or in areas where this was the means necessary for them to obtain television. In other words, the reason they have not accepted it in other areas was that it was possible for them to get some service—at least a limited service, at an expenditure of less money?

Mr. DOERFER. I think that you are right. I think that if this Commission had to do it over again, I think that it would probably have either all-UHF service—it would start out that way—or it would probably try to use both, so that they would not undermine each other.

However, it did not start that way. We are not talking today about a theory. We are talking about a practicality, a reality.

Mr. COX. But if in any area the Commission were to eliminate VHF and leave this community dependent upon UHF service, the public's need for television is such that they would then make whatever expenditure is necessary to get service, if they could get it?

Mr. DOERFER. Mr. Cox, may I throw this entire discussion in just a little better frame? You always talk about communities. I think that causes a good deal of the misunderstanding about our problem. There is not any television station that serves a community. It serves an area ranging from 40 to 80 miles in radius—just that large.

Mr. COX. Let us use the word "area," then, instead of "community."

Mr. DOERFER. I just want to make one more observation. The nature of the radio wave is really perverse, in a way. Not only does it provide a service locally; it has the power to destroy a service on the fringe. That is our problem—the fringe problem. It is not the local.

I suppose we could come along with a setup which would take care of the first hundred markets in this country, but by the same token, and in the same proportion, you would just take service away from literally millions of people, and that is our problem.

Senator PASTORE. Let me give you an example, John. I was coming back in my automobile from Washington to Rhode Island. I connected with a New York station. That station was on my band until I got to Rhode Island. I went all through Connecticut and all I could hear was that New York station. That does not mean I could not turn it off and get another station; but why does that one station have to have so much power?

Mr. DOERFER. You are talking about a radio station?

Senator PASTORE. Yes. And can you line that up with the problem we are having here? Fundamentally, that is the problem in the whole field, and yet what are we doing about it?

Mr. DOERFER. You know those high-powered stations are the only ones that bring a service, even though only a secondary service, to 20 million people in this country. There are 20 million people who do not have a primary radio service today. The Commission back there, in its wisdom, and I think rightfully so, provided some high-powered clear channel stations that will get a service to all these people, albeit a secondary service.

Senator PASTORE. Has not the situation changed?

Mr. DOERFER. No, it hasn't.

Senator PASTORE. You mean to tell me the situation is such that the people in Rhode Island, on the border of Rhode Island, must be listening to a New York station? That is the point I make.

Mr. DOERFER. What I am trying to say——

Senator PASTORE. I realize what you are saying. The hardest thing here is what you are going to do about 45 million TV sets.

Mr. DOERFER. Fifty-three million.

Senator PASTORE. That is not an easy problem. I recognize that. You are not going to resolve it easily.

Mr. DOERFER. At $50 a set, that is $2½ billion alone.

Senator PASTORE. I realize you have got this gray area you are talking about. But I would hope that somewhere along the line we would get one unanimous agreement on one definite policy from this Commission, so that the country would know once and for all exactly where we stand, and exactly what we are going to do about this.

I know that we can talk about these problems from now until the cows come home, and we have been doing that for 6 years. And as I said in my opening statement, I would hope that we would resolve this, one way or another, so that the Commission would tell us, not

what their problems are, but what their solutions are going to be. And if you are not going to bring in any solutions, and the problems are going to continue, then we want you to tell us so.

I just asked Bob Lee if he agreed with what you said. He said, "No, I don't." I don't know what the consensus happens to be on your Commission, and I know you are all hard-headed individualists, like we are on this side of the table. But the fact is, while you are a Commission of seven people, you must have one policy, you must have one decision.

The fact that you have seven different points of view is not going to solve this problem. Somewhere along the line you have got to take a stand and you have got to tell us, "This is the policy of the Commission"—and tell the country what it is, and tell this Congress what it is. You have not done that for 6 years.

Mr. DOERFER. I might say that I think if I were permitted to give you, in an organized capsule form, the comments which we have prepared, you would see that there is a plan, albeit not an immediate solution.

I might characterize it by saying this, that bearing in mind the facts of human nature and the laws of nature, this Commission is trying to evolve a policy whereby eventually the people can get as much service as possible without creating too much present dislocation, and perhaps as a greater risk, absolutely rising up and demanding that the Congress reverse the whole thing.

I think it is most serious that any commission or any Congressman would propose to start us down a road which would cost this country $2½ billion in an effort to acquire more service than it has, or the immediate prospects hold.

You have got to remember that over 88 percent of the people in this country get—I have the figures in here—do get—let me put it this way. Of the total television homes in this country, 98 percent of them are getting service. Well, the picture is not quite as black. There are a substantial number getting two and three services. I have the figures here and would be glad to read them in the record.

So that this concept that they are suffering from lack of service just does not add up, either against the figures or the public. They are smarter than we think they are. They have just decided for themselves. They will take it when they are ready, and they just don't happen to be ready in 1956, 1957, or 1960. I don't know when it is going to be.

The other answer is this. I think, unfortunately, we are in a cold war. If we did not have this situation, I do not think we would have much trouble at all in getting a sufficient band of VHF from the Government, sufficient to take care of the most optimistic needs or predictions of anybody that has given any thought to this problem.

Senator PASTORE. Do I understand you, then, to say—as you project yourself in the future, as you see it—the solution of this problem will be the relinquishment of more VHF channels from the military rather than the utilization of UHF?

Mr. DOERFER. We are hopeful. I know we did look pretty long, and Commissioner Ford is prepared to give you the benefit of whatever information is not classified to indicate the strenuous efforts this Commission has made in the past year.

If I may summarize it briefly, in my mind it amounts to this. There is, as you know, a division almost of the entire spectrum, 50 percent for Government and 50 percent for non-Government. That is the field that we are in.

With respect to those frequency characteristics which are peculiar to the defense of this country, there is no question in my mind at all that the non-Government user must not touch them. The defense of this country comes first. But I am not satisfied that there is not a lot of frequencies used by the Government which the non-Government people could have. It is a question of dollars and cents.

I would say this. I would like to present to this committee and to this Congress these figures, assuming—and you have to grant the assumption—that the resistance on the part of the Government is that it will cost them, say, $1 billion in equipment to make the transition. But I can show you that it is going to cost the people a minimum of $2½ billion. Would not this Government be much better off in making the appropriation, just from a purely economic viewpoint?

Senator PASTORE. Yes; but you do not allow for the attitude of the military. The military is not prone to give it up. They have resisted all efforts.

You remember we passed a bill in the Senate trying to set up a commission appointed by the President, with various representatives from the public and the Congress, in the hope that we could get an impartial body that could negotiate this agreement. I know we have talked about this time and time again. But we are no closer to agreement on the Government relinquishing part of the usage of channels than we were 6 years ago. You know that for a fact.

Mr. DOERFER. There is a bill pending in the House. I think it has a very salutary provision, and I think this is something this country just has to have before we can solve problems like this. You have got to have one body, one person who knows what all of the uses are, and whether they are being used efficiently, and who keeps a continual inventory with respect to the uses. And the same person has to be in the position—and he would be with that background of knowledge—to know how much could be shifted between the Government and non-Government users.

Senator PASTORE. I don't mean any impertinence, but just to see where we stand: How many of the Commission agree with what Mr. Doerfer just said? Would you raise your right hand? (No one indicated agreement.)

Mr. BARTLEY. I do not want to be misunderstood about not agreeing, because I do partly; and I think there is an agreement on a statement in the minds of the Commission, if he might give it.

Senator PASTORE. The only thing about the statement he is going to read is, I don't know who agrees with it or how many don't. I just asked a simple question: How many of this Commission agree with what John Doerfer just said? Raise your hand.

Mr. HYDE. You are asking us to give an immediate opinion on a very difficult situation which does not lend itself to a solution as simply as that. We have given this subject considerable attention. We have prepared a comment on it, to the Congress. I think that we could

easily be misunderstood, if you are voting "Yes" or "No" on just a simple matter.

Senator PASTORE. No. This is what John Doerfer said, that as he looks in the future, he sees a better solution of this problem in working out an arrangement whereby there would be a relinquishment, in the VHF band, of certain governmental uses that would be given to the commercial users, as against pushing on the UHF. That is how simple it is. That is a statement he made. Isn't that right, John?

Mr. DOERFER. Yes; I think the Commission has indicated that.

Senator PASTORE. I just want to know overall what the thinking of the Commission is on that point of view. And I cannot get an answer. So how am I going to get an answer from the Commission?

Mr. Cox. Mr. Doerfer——

Mr. DOERFER. Just a moment, Mr. Cox.

I think the Commission has agreed, with one slight reservation, and in its April statement we set forth, in order of priority, the five objectives.

Mr. Cox. Before you do that, Mr. Doerfer, do you suggest, if you are able to get VHF frequencies from the Government, that the cost of this reallocation would be borne entirely by the Government in the replacement of equipment?

Mr. DOERFER. Do you mean in the hands of the public?

Mr. Cox. Yes.

Mr. DOERFER. No.

Mr. Cox. You mention this $1 billion against the cost of $2½ billion to convert to UHF, but the public would have to buy all new sets to get the new channels?

Mr. DOERFER. I was using a hypothetical figure. Certainly if anyone was going to judge the thing from the point of view of the best economics to the country, he would add up the pros and the cons. That is all I am suggesting.

I only point out it would cost less for the Government to make a conversion than the public, and I would be the first to retreat from any suggestion that we take from the Government those frequencies which, because of their characteristics, have a peculiar military or defense characteristic or quality.

Senator PASTORE. All right.

Then you had better proceed in your own way, Mr. Doerfer. But we are just going to have a nice recitation here for a couple of hours, and by the time we get through with it, as far as pinning anybody down to anything, it will mean nothing.

Mr. DOERFER. I do not think so. I think this represents the majority view and——

Senator POSTORE. Well, what is this majority view? Can I get the vote on it? Is it 4 to 3? Is it 5 to 2? What is that vote? Or is that a secret?

Mr. DOERFER. No; I am talking about this April—the 50-channel system, the 5 propositions that were given. I think that Commissioner Lee—I think the vote is 5 to 2.

Senator PASTORE. Five to two; all right. We will hear it. It is getting closer.

Mr. DOERFER. In April 1959, on behalf of the Commission, I submitted to the Senate Committee on Interstate and Foreign Commerce

a detailed report with appended data, setting out, among other things, the numbers and locations of VHF and UHF television stations, tracing the rising tide of VHF service and the progressive attenuation of UHF services, discussing alternative bases for long-range approaches to the goal of increasing the number of television outlets under a nationwide, competitive system, and outlining proposed policies for the interim pending efforts to compare and determine the desirability of the five alternative long-range approaches. Without burdening you with the restatement of the matters discussed in that report, and at this point may I offer this for the record. We sent that in.

Senator PASTORE. Yes, it will be made a part of the record.

(This statement, dated April 19, 1959, which was submitted in writing to the committee at that time, is as follows:)

STATEMENT ON BEHALF OF THE FEDERAL COMMUNICATIONS COMMISSION, PRESENTED BY JOHN C. DOERFER, CHAIRMAN

INTRODUCTION

Mr. Chairman and members of the committee, since our previous appearance before your committee in May 1958, the Commission has been studying intensively the television allocation problem. We have given this study No. 1 priority, and have met frequently to discuss various alternative courses of action. A special staff group, assigned to this study, was directed to prepare test assignment plans and such other analyses as required by the Commission.

Recently, also, the Commission received the report of the Television Allocations Study Organization (TASO) embodying the results of its research into the technical aspects of present and potential VHF and UHF television service. The TASO work included studies of transmitting and receiving equipment, prediction and measurement of signal propagation, and subjective determinations of picture quality levels, together with field tests and theoretical analyses of television service. TASO's functions were limited by its charter to technical study, factfinding, investigation, and interpretation of technical data. Accordingly, TASO has not recommended any specific technical standards for the Commission to use in its regulatory work. The selection of such specifications remains the Commission's responsibility, but complete data were supplied from which such a choice could be made. Furthermore, the TASO data on equipment were based on current design and performance, and estimates of possible future improvements are left for the Commission to determine.

The work of TASO has been concluded, with the exception of tests of directional transmitting antennas, and the preparation of a final report of the panel dealing with analysis of the accumulative data. It is expected that these remaining tasks will be accomplished within the next few months.

The TASO report is a comprehensive and useful compilation of technical data on the various factors affecting television service. These data have been taken into account generally by the Commission in this presentation. Further detailed study of the TASO report will be a part of the Commission's continuing consideration of television allocations and service.

In the course of the Commission's deliberations to date, we have reached substantial agreement on two general conclusions, as follows:

1. No rearrangement of the 12 VHF channels can provide for a nationwide, competitive television system, adequate for the reasonable needs of our growing population and expanding economy. While the Commission has stated this conclusion on a number of previous occasions, we deemed it highly desirable to subject this view to a critical reevaluation. Accordingly, we examined various methods of extending the use of the 12 VHF channels, from reducing present minimum cochannel and adjacent channel spacings to an overall reshuffling of television assignments. Various engineering concepts of allocations were explored in practical interrelationship with economic and policy criteria. These studies demonstrated that while immediate shortages in some communities could be alleviated, other long-range public interest criteria could not be satisfied within a 12-channel system.

2. The Commission is likewise convinced that "deintermixture"—the assignment of VHF—only facilities to some communities, and UHF—only to others—cannot provide a long-term answer to the allocations dilemma. Deintermixture limited to selected communities cannot provide the needed stimulus for future UHF expansion. Area deintermixture, on the other hand, would involve large-scale disruption to the public and introduce inequities and inefficiency in the distribution of station facilities among the separate communities and States.

The alternative policies, which we have studied, may be summarized, as follows:

(*a*) A 50-channel VHF system, retaining the present 12 VHF channels.

(*b*) A contiguous 50-channel VHF system, retaining the present VHF channels 7 to 13 and withdrawing from television use channels 2 to 6.

(*c*) A contiguous 25-channel VHF system, retaining channels 7 to 13.

(*d*) The present 82-channel VHF–UHF system.

(*e*) A 70-channel all-UHF system.

The Commission feels that before it can finally agree on one or another of these alternatives, it must ascertain whether a wholesale reallocation of VHF spectrum space would be feasible and in the public interest. In this connection, the Commission is currently exploring with the Government (OCDM) the possibility of reallocating the Government band above 216 megagycles to non-Government use. We are hopeful that a definite answer to this question can be given within the next few months. While the same question was answered in the negative in 1956, the Commission feels that renewed discussions with Government allocation officials on this issue are very much in order. Certainly, our search for a solution would be incomplete without a final determination of the possibility of a VHF reallocation.

If, however, additional VHF frequencies become available for non-Government assignment, the Commission must consider the needs not only of television but of other vital radio services seeking additional space in this portion of the spectrum. The requirements of these services for frequencies are currently being examined by the Commission in a general reallocation proceeding involving the spectrum between 25 and 890 megacycles (docket No. 11997).

STATEMENT OF PROBLEM

The crux of the television allocation problem is the severe limitation on the number of stations, arising from the inability of the UHF broadcasting stations to develop as an integral part of a nationwide, competitive television system. Station growth has practically reached its ceiling within the 12 VHF channels allocated to television, while only minor clusters of stations presently survive within the 70 UHF channels.

As of April 1 a total of 434 VHF and 75 UHF commercial stations were in operation in 268 TV markets. (See appendix A.) These figures have changed little during the past 2 years, although the economic indexes of the industry continue their upward trend and the potentialities for profitable operation at least in the larger markes are highly attractive.

The Commission's hope for the commercial success of UHF television expressed in the sixth report and order has not materialized. Since 1952 almost half of the 369 permits for UHF stations have been voluntarily surrendered. Even more significantly, 90 of the 165 UHF stations which were constructed and put into operation are now off the air. By way of contrast, in the same period only about 10 percent of the VHF permits issued have been turned back and only 6 out of the 333 VHF stations constructed are now off the air.

Nor are there any favorable trends pointing toward a substantial improvement in the UHF situation. Current statistics of the TV set manufacturing indusry indicate that production of all-channel receivers has dropped below 10 percent of total production. A recent commercial nationwide survey of TV homes in the spring of 1958 reported only 3.2 million TV homes viewing one or more UHF stations. (A similar survey in 1956 reported 3.7 million UHF homes.) Furthermore, of the 75 commercial UHF stations in operation during the first half of 1958 only 26, or 33 percent, reported profitable operations.

The inability of UHF stations to prosper in the presence of VHF service has severely limited the opportunities to establish additional stations in many markets throughout the Nation. For example, among 103 top television markets there are 36 with less than 3 VHF or 3 UHF stations now in operation or anticipated. Many of these are numbered among the Nation's largest popula-

tion centers, such as Hartford-New Haven, Grand Rapids-Kalamazoo, Birmingham, Providence, Dayton, Toledo, Syracuse, and Rochester. In virtually all of these areas, the shortage of facilities in operation is a serious obstacle to fully effective competition both at the network and the community levels.

The inability of UHF to provide additional television outlets has been felt keenly in these 36 markets. The table below describes the UHF history in these markets:

	Number of markets
TV markets among top 103 with less than 3 VHF assignments and in which—	
UHF is now on the air	11
UHF failed	8
UHF never attempted	17
Total	36

Of the 11 markets in this group where UHF is now on the air in competition with VHF, the UHF operators in most of these communities have filed petitions with the Commission alleging inability to survive and urging the Commission to provide relief through substitution of VHF for UHF, or through deintermixture to all UHF.

UHF stations tend to persist mainly in those areas where only negligible VHF service is available to the community by virtue of either distance or terrain. Outside the top 103 TV markets, UHF is operation in 33 communities; all but 5 of these are UHF only. Many of these UHF-only communities receive some VHF service from other areas and this, coupled with the fact that the UHF-only market is typically small, leads in most cases to unprofitable operation for the UHF.

Under these circumstances, it is clear that virtually no opportunity exists under the present allocation plan for long-term growth in the number of television stations. Only 70 of the total commercial VHF assignments within the continental United States are potentially available for new stations, and these are located in sparsely populated areas of the North Central and Western States. Few, if any, can be utilized in areas where demand now exists for stations.

Any allocation plan designed to meet the Nation's television needs must provide opportunity for expansion. No precise formula is available for gaging the extent of future demand for television service. It must be assumed, however, that the television broadcasting industry, which has grown into a billion dollar industry in the short space of 10 years, would continue to expand substantially provided additional channels were available on which stations could operate on a competitive basis.

The task is to shape an allocation plan that will foster an expanding and competitive nationwide television system. Such an allocation plan should provide adequately, within the framework of private operation, for coverage of all the people, for local community outlets, for competition particularly in the larger markets, and for educational needs.

These characteristics of a nationwide television system have been often stated by the Commission. The prime importance which the Commission attaches to encouraging nationwide service and the great value it places on local community outlets and educational television are generally known. A word of explanation is in order, however, regarding the need for competitive facilities in the larger markets. In the sixth report, and in subsequent amendments to the table of assignments, the Commission allocated an average of 6 to 7 commercial and educational assignments to each of the top 100 television markets, with a maximum of 10. This was appropriate with 82 channels and the expectation that UHF would be competitive. In its current studies, however, the Commission has faced the hard question: What is the appropriate number of assignments which should be made to these major population centers, assuming that the present TV allocation plan must be altered and less overall spectrum space is available to television?

The Commission's answer is that it would be desirable in the public interest to assign at least five stations (four commercial and one educational) to each major television market, if this can be done consistent with the availability of spectrum space and the needs of other radio services. In general, these major markets have 100,000 or more homes within the area covered by a TV station signal, and include combinations of separate communities following the actual pattern of national television advertising (e.g., Hartford-New Haven-New

Britain-Waterbury is defined as one market). Adequate stations in these markets are critically necessary both for satisfying the requirements of national and local competition.

Prior to the establishment of television stations in small towns, coverage of the rural and fringe population is dependent, primarily, on service from stations in the large urban centers where advertising support first develops. The stations located in these top 100 markets can reach approximately 85 percent of all homes, thus providing the basic framework for a nationwide service.

Similarly, the number of outlets in these markets is directly related to the opportunities for competition among networks and other television program suppliers. If there are adequate facilities in these markets the industry as a whole benefits. Advertiser support for the medium is stimulated, and the supply of program fare is expanded. The greater availability of program product is of benefit to all stations, large and small, as well as to the public.

Compared to the present situation, 5 stations allocated to and operating in each of the top 100 markets would encourage existing and new network competition, more fully satisfy other national and local needs, and provide more adequately for the Nation's educational television service.

The remainder of this presentation discusses each alternative course of action looking toward the development of a television system generally geared to the above criteria.

TELEVISION WITH 12 VHF CHANNELS

The number of stations within the 12 VHF channels has practically reached its ceiling, given current co-channel and adjacent-channel minimum spacing requirements. The approximately 70 VHF station assignments currently unapplied for are in areas with very low population density, and these assignments cannot be transferred to areas where additional stations are in active demand. Any possibilities for dropping in additional assignments or moving unused assignments are so limited as to be considered practically insignificant.

One obvious method of increasing the number of stations in the VHF band is to reduce station spacing requirements. This technique can be used to remedy current shortages in a number of markets. It cannot, however, provide sufficient outlets to satisfy the longrun, expanding needs of television as set forth in our criteria.

This conclusion is based directly on test plans embodying 3 different approaches to the distribution of assignments within 12 VHF channels. In one approach all existing VHF assignments were left undisturbed, and new assignments were squeezed in at reduced spacing. This plan demonstrated that any sizable increase in the number of outlets could be obtained only through drastic reduction in station spacing. Because of the geographical distribution pattern of cities, a large increase in assignments is obtainable only at minimum co-channel spacings in the neighborhood of 100 miles. With such spacing, the usable signal of the squeezed-in stations would extend only a few miles in the direction of operating stations on the same channel, if full protection were afforded the service areas of existing stations. The alternative would be to reduce the service range of established stations in order to provide an economically feasible service area for the new stations. Under the latter alternative, coverage of both the new and the established stations would be limited effectively to 30–35 miles. (The technical parameters used in the test assignment plans are shown in appendix B.)

Such shrinkage in the service areas of individual stations results in "white" areas where mutual interference destroys service now available. The rural and fringe population residing in these areas would be deprived effectively of television service unless or until new stations were established nearby. Thus, a plan which requires general reduction in station spacing may delete some or all of the program services for an indefinite period in many homes where such program services are now available.

Moreover, despite its many unrealistic spacings, the test plan did not contain sufficient outlets to meet the Commission's criteria. It fell short of providing even 4 stations to each of the top 100 markets. The greatest weakness of the plan was its inability to meet the long-run needs of communities for local outlets. It could not satisfy even the current needs of these communities. For example, it did not permit sufficient VHF assignments to replace the assignments of all operating UHF stations in the same communities. It was unable, likewise, to provide a VHF facility in each community where a UHF permit is currently held, or where UHF operation has been attempted and failed.

Generally, the same shortcomings are evident in two other plans of assignment within the 12 VHF channels. In one of these plans, less extreme cuts in station spacing were used but the present frequency assignments of operating VHF stations were extensively reshuffled as though the television industry were starting from scratch. While this plan was more efficient than the other alternatives, it too involved reduced station service areas and insufficient room for the growth of competitive stations in the larger markets or of local outlets in smaller communities.

The third approach also started from scratch without regard to the present frequency assignments of stations; it attempted to assign channels in clusters rather than individually as a means of maximizing channel efficiency. This principle could not be applied generally, however, because of the variegated pattern of distances between cities, the impracticability of assigning the same number of stations uniformly to all communities, and the limitations involved in protecting against adjacent channel interference. This approach proved little more than an exercise: It would disrupt the present VHF television structure without significant compensating benefits.

In our analysis, we also considered the possibilities of using precision offset and directional antennas. Based on the latest available data, it appears that neither of these techniques can overcome the inherent limitations of a 12-channel system. Theoretically, with precision offset cochannel separation could be reduced from 170 to 140 miles without reducing the service areas of the stations. This calculation is based on theoretical computations; it has not been subjected to the rigors of general field testing involving a large group of stations. More important, a reduction in minimum spacing of this order cannot make possible the needed flexibility and expansiveness of assignments. As stated above, a significant increase in the number of assignments is possible only if cochannel spacing is reduced to 100 miles, but at this level precision offset is relatively ineffective in maintaining adequate service areas.

With respect to directional antennas, it has not yet been demonstrated that they can be relied upon as an allocation tool for reducing minimum station spacing on an overall basis. A further study of this problem has been started by TASO.

In summary, it is virtually impossible within the confines of 12 channels to have both sufficient competitive outlets in the major markets and local outlets in a large number of communities. A 12-channel television system is inadequate, however, the spacings are juggled. If additional assignments are made to some of the larger markets, this necessarily restricts the potentialities for local outlets or educational assignments in other communities.

For all of the above reasons, the Commission has concluded that the allocations dilemma cannot be resolved on a long-range basis within the 12 VHF channels.

TELEVISION WITHIN A DEINTERMIXED VHF–UHF SYSTEM

As described earlier, the general inability of UHF stations to compete in markets with VHF stations has led to the present critical television allocation situation. To remedy the incompatibility of UHF, the Commission in 1956 undertook to explore the interim possibilities of improving the opportunities for effective competition among television stations, pending a long-range allocation solution. The program involved a study of the feasibility of converting to noncommercial assignments or eliminating some or all of the VHF channel assignments in designated cities having UHF stations, and the transfer of the displaced VHF channels, to the extent feasible, to wholly VHF areas where they would increase the number of VHF services.

In assessing deintermixture, the Commission stressed its limited utility in fostering the fuller utilization of UHF channels on a nationwide basis. Hopefully, deintermixture could serve to increase the number of competitive outlets in some communities, establish a core of viable UHF markets, and halt further deterioration in the UHF industry. However, the Commission in its report of June 1956 pointed out the following shortcomings inherent in an extensive nationwide program of deintermixture: the undesirability of eliminating VHF assignments in areas with little UHF set saturation; the penetration of most areas with signals from VHF-only markets and the consequent inability to carve out significant areas in which UHF could grow; and the likelihood that elimination of local VHF assignments would create substantial "white" areas, unless the UHF broadcaster could somehow substantially extend his service area or unless the public in these areas undertook the additional cost of erecting high

receiving antennas. As a result of those considerations, the Commission described deintermixture as an "interim" measure, pending adoption of a long-range solution.

Experience with deintermixture in the intervening years has demonstrated that it is ineffectual as a national allocation policy. One or another pertinent consideration has served to narrow the possible communities in which deintermixture could be justified in the public interest: the opportunity to add VHF assignments at approved minimum spacings through simple "dropins," rearrangement of assignments in other nearby communities, or relocation of station antennas; the danger of creating "white" areas; the availability of multiple VHF signals from nearby major centers; unfavorable terrain; or insufficient UHF set conversion. Procedural delays flowing from adjudicatory requirements in those instances where the Commission has ordered removal of a VHF assignment also have served to minimize the immediate benefits expected from deintermixture.

Nevertheless, in line with our decision to reexamine and reevaluate all possible allocation measures, studies were made of deintermixture, both on a selective community and on a general area basis. Two assignment plans incorporating these approaches were studied.

In one study, a total of 23 communities containing approximately 1 million homes were selected for deintermixture to all UHF. The markets selected generally have one VHF and one or more UHF assignments and are reasonably distant from VHF-only markets. Included in the 13 communities were places such as Lancaster, Manchester, Flint, and Spartanburg which have UHF assignments but no operating UHF stations and thus have little or no UHF set saturation. A transition to UHF in these markets would be a slow and difficult process. Furthermore, it is not certain that some of the new all-UHF communities would be sufficiently distant from VHF centers to avoid "overshadowing." Thus, UHF in Lancaster would be subjected to the competition of Philadelphia VHF stations, UHF in Manchester could be effectively "overshadowed" by Boston, and UHF in Flint could be adversely affected by Detroit. There is no firm assurance therefore, that UHF stations would be built in all these new UHF communities.

Another relevant consideration in assessing this limited deintermixture plan is the impact on UHF set production. Undoubtedly, deintermixture in these communities would provide some additional stimulus to set manufacturers. However, the market for new UHF-equipped receivers would be substantially less than the estimated 1 million homes in these 23 communities since a number of these communities already have partial UHF set distribution.

The limited effect of a selective deintermixture plan on the promotion of UHF suggested the alternative approach of area deintermixture. Here the objectives were to insure the continuance of present UHF operation and to create areas and populations dependent upon UHF service sufficient to provide a strong incentive to receive manufacturers to produce all-channel receivers. The deintermixture area was outlined by including a chain of communities having UHF experience; this was expanded to encompass nearby and interspersed VHF communities in order to form a solid and sizable UHF-only area.

In order to insure that the areas and populations dependent upon UHF would be large enough to foster the UHF industry generally, it was found necessary in the plan to deintermix many large markets with little or no previous UHF experience. Examples of such markets include Cincinnati, Atlanta, Louisville, Indianapolis, Columbus, Rochester, Dayton, Toledo, and Syracuse, among others. This particular area deintermixture plan would require the deletion of about 90 VHF stations which could not be transferred elsewhere. As a result of such drastic reshuffling of assignments, a total of some 12 million homes might become dependent upon UHF for television service in these areas.

The shortcomings of this approach are readily apparent. The criteria for selection of the areas for deintermixture are too vague to prevent "discrimination" as among communities; the dislocation is too substantial without necessarily insuring that all receivers would thereafter be all-channel sets; and there would be little or no additional opportunities for communities within the VHF-only areas to have a local outlet or multiple stations.

Therefore, at this time the Commission concludes that broad area deintermixture would be too disruptive to be feasible as an interim measure and too inefficient because of its partial use of the VHF and the UHF channels to serve as a long-run solution.

ALTERNATIVE COURSES OF ACTION

Short of a major technical innovation, it appears that the Commission's long-run objective of a fully expanded, competitive nationwide television system cannot be realized within 12 VHF channels or through deintermixture. Accordingly, the Commission has been studying various alternative courses of action, each of which will be discussed in turn.

50-CHANNEL VHF SYSTEM, RETAINING THE PRESENT 12 VHF CHANNELS

The optimum or ideal solution for television would be a fully expanded, all-VHF allocation. Such a system would meet the public demand for a generally satisfactory and economical service, under varying home conditions.

This raises two critical interrelated questions: As a practical matter, can the necessary additional VHF spectrum space be allocated to television? And what are the costs of such reallocation?

As a preliminary step, we have attempted to ascertain the minimum number of channels required. The number of channels which should be assigned to television, obviously, is a matter of judgment. The policy factors to be assessed include the importance of television to the American people, including television's contribution to political, economic, religious, educational, informational, entertainment, and other public needs; the current and long-run demand for television stations; and the conflicting needs of other services. Balancing these and other considerations, the Commission in the sixth report assigned 82 channels to television. This compares closely with the assignments to other broadcast services—107 channels to AM and 100 channels to FM. Television, however, requires a far larger share of the spectrum. A single TV channel occupies 600 times as much spectrum space as an AM channel and 30 times as much as an FM channel.

Concurrent with and following the allocation of spectrum space to television, a great many other services have been allocated space in the VHF or lower UHF bands. Because of the requirements of these various other services, television cannot retain its 82 channels if it must develop largely within the VHF. Accordingly, the question is posed as to the minimum number of channels necessary and feasible for a nationwide, competitive television system, with fair, efficient, and equitable distribution of facilities among the States and communities.

On the basis of our studies, we have determined that 50 channels would provide ample opportunity for a nationwide, competitive television system. Sample assignment plans were drawn covering 19 States east of the Mississippi River and north of Tennessee and North Carolina. The problems of equitable allocation of assignments are greatest in this region because of the dense population and the concentration of cities. Minimum cochannel spacings of 170 miles and adjacent channel spacings of 60 miles were maintained, and appropriate protection was provided Canadian assignments according to existing agreements. With these safeguards of individual station coverage, it was possible with 50 channels within and adjoining the VHF band to provide sufficient assignments to foster competition in large markets, to meet the requirements of an expanded educational television service, and to permit a considerable growth in local community outlets.

With 50 channels, a minimum of 5 stations could be provided in all major television markets. In a number of these markets, additional assignments would be available when needed. At the same time, it would be possible to provide liberally for the future growth of community facilities. For example, an assignment would be available to replace every operating or authorized station, VHF or UHF. Moreover, at least 1 station could be assigned in this region to every community of 35,000 population or more which was located in a county of at least 50,000 population. Assignments could also be made to large "overshadowed" communities such as Atlantic City, Worcester, and Easton-Allentown now blanketed within the service areas of multiple stations located in nearby, major markets. While the public in the overshadowed communities have a choice of programs, the Commission believes they should also have the opportunity to be served by local stations, if this proves economically feasible.

Based on the test plans it was determined, further, that with 50 channels provision could be made for educational television, both in the large markets and in smaller communities which are important educational centers.

If 50 channels could be allocated to television within, and adjoining, the VHF band there would then be a reasonable opportunity for television's expansion. However, for years the VHF band has been in great demand by various other radio services. In fact, the demand generated by highly important services—including police, fire, transportation, industrial, and business—far exceeds the supply of VHF frequencies. The demands of these services for additional spectrum space is so critical that the Commission is currently engaged in a general allocation proceeding with respect to the spectrum space between 25 and 890 megacycles.

Nevertheless, from the standpoint of meeting television's needs, it would be highly desirable if the present 12 VHF channels allocated to television could be retained and space provided for 38 additional channels. This would minimize the disruption and transition cost for the public and the broadcasters, particularly if all operating VHF stations could continue without change in their frequency assignments. The TV allocation would be divided into three noncontiguous segments as at present: 54–72 megacycles (channels 2–4); 76 to 88 megacycles (channels 5–6); and 174 to 444 megacycles (channels 7–51). This would require an additional block of 228 megacycles above television channel 13. On the other hand, the UHF TV allocation which begins at 470 megacycles and extends to 890 megacycles could then be released for nonbroadcast services. The band 216–450 megacycles is allocated exclusively to the Government, except for the amateur bands 220 to 225 megacycles and 420 to 450 megacycles, the aeronautical radionavigation band 328.6 to 335.4 megacycles, and the meteorological aids band 400 to 406 megacycles, which are available to both Government and non-Government users on a shared basis. The bulk of the Government operations between 216 and 450 megacycles is military. For reasons of equipment standardization many countries have allocations that closely parallel those of the United States. If, therefore, changes are made in the domestic allocations for television and general communication services, this will affect allocation decisions in other countries. Any such spectrum reallocation must therefore be coordinated closely with the other interested nations. The time required to complete such negotiations and implement the changes would undoubtedly extend over a period of years.

Furthermore, since a number of the systems operating in the band 216 to 450 megacycles are there because of the propagation characteristics of that portion of the spectrum, they would have to be moved to frequency bands with similar characteristics if they are to continue to perform the function intended. It must be determined, for example, whether existing operations in the vicinity of 216 megacycles could perform properly if moved above 450 megacycles. As a practical matter, also, it is highly unlikely that the band 328.6 to 335.4 (the equivalent of 1 TV channel) could be reallocated, since this change would affect all aircraft equipped for instrument landing.

It must also be pointed out that a 50-channel system, as described above, would be located almost equally within the VHF and UHF bands. There would be 26 channels in the VHF portion of the spectrum, which extends to 300 megacycles, while the remaining 24 channels would extend into the lower portion of the UHF spectrum. The last channel at 444 megacycles would cut off below the present UHF TV band, which begins at 470 megacycles. However, the upper channels within the 50-channel system would be more subject to shadows, absorption, and other undesirable effects, and would permit less extensive service areas than do the present 12 VHF channels. In particular, there would be a variation in service area as between stations operating on the lower VHF channels and those on the upper channels.

Transition to an expanded VHF system would also involve additional costs to the public. Of the 44 million television homes, none is equipped to receive VHF channels above channel 13. Presumably, in the course of a 10-year period, practically all these homes would replace their current television sets. Hopefully, all such new receivers would be equipped to receive all 50 channels. If contrariwise, the bulk of the public continued to purchase sets equipped to receive only the 12 VHF channels, the television allocations dilemma would remain unsolved. For, under such conditions, the new VHF stations would face the same economic hardships as UHF stations have suffered since 1952.

Although the Commission cannot predict the production and marketing plans of television set manufacturers, we would earnestly hope that the television broadcasters and manufacturers would utilize their full resources to promote the success of an expanded VHF system. The long-run private interests of the tele-

vision industry, no less than the interests of the viewing public require a solution of the television allocation problem and the establishment of a nationwide, competitive television system.

However, we cannot rely on optimistic expectations. The UHF experience, and the FM experience earlier, suggest that within the competitive market framework the tendency to cost costs militates against the universal production of all-channel receivers. The incentives will be strong to continue to market receivers predominantly equipped for 12 channels only, in line with the present-day set production and distribution pattern. To disturb this pattern and to produce a new receiver equipped for all 50 channels imposes new costs on the industry which, initially at least, is likely to be passed on to the consumer. Some of the same difficulties which now beset manufacturers in producing an efficient and convenient VHF–UHF receiver would likewise be present in producing a set required to cover the frequencies ranging from 54 to 444 megacycles. Television manufacturers may conclude that their production should include both 12-channel and 50-channel sets, as well as sets equipped to receive some intermediate number of channels. These manufacturers will maintain that they can thus satisfy the public best. If stations in one community operate on channels 2 to 13, why burden the public in that community with the additional cost of a 50-channel set? On the other hand, if stations in another community begin operation at channel 14 or above, the manufacturers would then proceed to supply receivers for these new channels for that community.

However reasonable this policy may appear, it could start in motion a vicious circle. Without an audience, the new stations will lack advertising support; lacking such support the stations will fail. New broadcasters will risk their capital in developing the new VHF channels only if there is a reasonable likelihood that all-channel receivers will be widely distributed. However, in the major markets with three or more stations in operation the average consumer is not likely to insist on a receiver which would enable him to receive additional stations in the future. But if these markets which purchase the bulk of all television receivers are supplied with 12-channel sets only, then the incentives will not exist for the development of a 50-channel television system.

In short, there is the danger of repeating the VHF–UHF experience unless steps are taken to require the production of sets equipped to receive the new channels as well as the established 12 VHF channels. This appears an essential prerequisite for the success of any long-run measure to resolve the television problem even though it has the disadvantage of adding to the cost of receivers. It would require, however, a legislative enactment that all TV sets shipped in interstate commerce must be equipped to receive all channels assigned to television. If such a statute were coupled with the removal of the set excise tax, this could serve to offset partially the added cost to the public of the new receivers.

We have indicated some, and by no means all, of the major difficulties necessarily involved in any such wholesale change of the present television structure. Under the best of circumstances, the transition would take at least a full decade; it would involve the expenditure of large sums of money by the Government for conversion of existing facilities; it would require the cooperation of other nations; it might cost the public some additional, although now indeterminate, sums for all-channel sets; and it would require new legislation to insure production of all-channel receivers only.

CONTIGUOUS 50-CHANNEL TV SYSTEM RETAINING CHANNELS 7–13

The first alternative, which has been discussed above, looks toward a 50-channel system retaining all of the present 12 VHF channels. A second alternative is a continuous 50-channel system beginning at 174 megacycles (channel 7) and extending upward to 474 megacycles. The spectrum space required for this plan is now almost entirely allocated to the Government between 216 and 450 megacycles and to non-Government land mobile radio services between 450 and 470 megacycles.

This alternative would involve the release of the lower portion of the VHF spectrum, now used by TV stations on channels 2–6, and the release of the UHF TV allocation. This would increase the net amount of spectrum space available for allocation to other services by 192 megacycles (i.e. the difference between the present 82 channels and 50 channels). It also may better serve the needs of various communication services which now require some additional VHF or UHF spectrum space. Further, there may be some economies in set design and produc-

tion in a continuous band between 174 and 474 megacycles. The ratio between the lowest and highest channels would be less than 2½ to 1, as compared to the ratio of 16 to 1 in the present VHF–UHF system.

On the other hand, this alternative would be subject to the same complex and costly conversion and transitional problems as outlined with respect to the first alternative. In addition, the loss of channels 2–6, while releasing valuable spectrum space for other services and increasing the incentitive of the public to purchase new receivers, will impose a substantial burden on the stations required to move to new assignments above 216 megacycles. Aside from the cost of additional transmitting equipment, the present service areas and the audience of these stations would be reduced.

We must assume that such wholesale frequency reassignments will be opposed by individual stations. If we were required to hold an adjudicatory proceeding with respect to each such frequency reassignment, the process could be so time-consuming and burdensome as to defeat any solution of the television problem. To cope with this procedural hurdle, we may recommend an amendment to the Communications Act authorizing the Commission to change the frequency of any individual station through a general rulemaking proceeding, when an overall readjustment of station assignments is required in the public interest.

CONTIGUOUS 25–VHF CHANNEL SYSTEM RETAINING CHANNELS 7–13

Previously, two expanded VHF television allocation systems were discussed, both comprising 50 channels. Another alternative studied was the allocation to television of 25 contiguous VHF channels.

This approach recognizes the possibility that because of national defense and other needs it may prove infeasible to allocate to television 50 channels in the VHF and the contiguous UHF frequencies. The Commission, therefore, considered the minimal number of channels which would correct the serious deficiencies of the present television system. Our studies have indicated that the lower limit of such an allocation to television is 25 channels. The allocation would begin at television channel 7 (174 megacycles) and continue to 324 megacycles. Under this alternative, television would lose channels 2–6 in the lower portion of the VHF band and would obtain from the Government the additional spectrum space between 216 and 324 megacycles.

As would be expected, a 25 channel system falls short of achieving the flexibility and the opportunities for station expansion in local communities which are possible in a 50-channel system. With present minimum spacing requirements, a 25-channel plan would allow 5 stations in the bulk of the top 100 television markets. The opportunities for growth above this minimum would be limited, however.

The major shortcoming of a 25-channel plan lies in its inability to meet community needs for local outlets. If it is to allow expansion in the large markets, it must skimp in its assignments to other communities. As an illustration, 65 communities were selected in the test area as requiring one assignment. Included in this group were "overshadowed" communities and other medium and smaller communities with a cut off, as mentioned previously, of 35,000 city and 50,000 county population. Under a 50-channel plan, all of these communities could have a local assignment. With 25 channels, station assignments could not be made to 50 of the 65 selected communities.

Obviously, if the 25-channel plan were drawn with different specifications, as, for example, limiting the top markets to a maximum of 4 assignments, more assignments would be available for smaller communities. Overall, a 25-channel system would permit moderate expansion in the present number of stations, thus strengthening the competitive position of the third network while permitting additional educational or independent station operation. It would also permit the release of substantial spectrum space in the UHF and VHF bands for other radio service. As against these advantages must be weighed the inevitable costs of a changeover from the present system.

EIGHTY-TWO-CHANNEL VHF–UHF SYSTEM, WITH ALL SETS CAPABLE OF RECEIVING BOTH VHF AND UHF

If our current study with the Government discloses that a rearrangement of the non-Government allocation to provide sufficient additional channels in the VHF and adjoining UHF frequencies for television is infeasible, the alternatives are the present 82-channel VHF–UHF system, or an all-UHF system.

Our earlier discussion indicates quite clearly that the present intermixed system will not work so long as the overwhelming bulk of home sets are equipped to receive only the 12 VHF channels. It appears that this critical handicap can be overcome only by imposing a statutory requirement that all television sets shipped in interstate commerce should be equipped to receive both VHF and UHF channels. UHF conversion would then come automatically over the next 10 years, as the public replaced present receivers. If UHF stations were potentially able to reach all television homes in their communities, this might provide the necessary stimulus for the widescale development of UHF service.

This course, if effective, would have many advantages. By retaining the 12 VHF channels, wide-area service to rural and fringe populations would be insured throughout the United States. At the same time, the 70 UHF channels would permit multiple stations in the major markets as well as local stations in over 1,000 communities.

Moreover, UHF could grow with a minimum of disruption to the present television structure. The public would continue to receive service from all operating stations, VHF and UHF. At the same time, existing UHF stations would be strengthened as the normal turnover of receivers eventually resulted in all television homes being converted to UHF. The expansion of UHF–equipped homes, in turn, might attract new UHF stations to the air. Thus, over the next decade, the public could have a wider choice of program sources, commercial and educational, national and local.

Such nationwide distribution of all-channel receivers cannot be accomplished, however, without cost. It is likely that the public will be required to pay more for an all-channel receiver than for a VHF-only set. At present, the differential averages about $25. In addition, the installation of an outdoor UHF antenna is required in most homes beyond the immediate confines of a UHF station. The cost for antenna and installation may add another $25 or more to the consumer's price. Thus, if the average cost of a VHF-only installation is $200-$225 the comparable price of an all-channel installation may be 25 percent higher.

Whether the differential would remain at this level depends on the outcome of a number of conflicting forces. Undoubtedly, there would be a strong tendency toward cutting the differential. If set output were 100 percent all-channel instead of less than 10 percent as at present, some savings would be found and the pressure of competition, which is so strong in radio set manufacturing, would lead to lower set prices.

On the other hand, there would also be cost-increasing forces at work. Today's UHF receivers are significantly inferior to VHF receivers in noise level, in ease of tuning, and in the longevity of some components. Those inadequacies in UHF tuners serve to reduce the quality and range of UHF signals, and are a significant factor in the difficulties encountered by UHF stations in building and retaining audiences. In intermixed VHF–UHF communities where a full schedule of popular network programing has been on UHF stations (viz Buffalo, Hartford, Milwaukee, etc.), the UHF-equipped public has tuned to fewer network programs on these stations than anticipated on the basis of the audience appeal of these same programs in other communities where the programs were presented on VHF stations. While this difference in public response cannot be attributed entirely to the relative inferiority of the UHF receiver, it is an important factor.

The set manufacturer has, or can develop, the techniques necessary for improving UHF tuners. These, however, would increase the cost of production and, because of the declining market for UHF receivers, manufacturers have been reluctant to undertake costly equipment redesign and development. Presumably, this trend would be reversed if television set production were exclusively in combined VHF–UHF receivers. With a greater market potential, manufacturers would have an opportunity to introduce improved UHF tuners even if it necessitated a somewhat higher price to the consumer.

The same effect might also be achieved if the legislation requiring VHF–UHF receivers empowered the Commission to set reasonable standards in the public interest with reference to the quality of the receivers. Pursuant to such a mandate, after a given period to permit a changeover, the Commission might, for example, withhold type approval of UHF tuners which were substantially inferior to VHF receivers.

Whether introduced voluntarily or by Commission direction, improvements in UHF sets may result in higher prices to the public, at least initially. The net effect of this tendency as against the price-reducing factors previously mentioned

cannot be gaged. Certainly we cannot overlook the possibility that the price of the combined VHF–UHF receivers might continue to be higher than the cost of present VHF-only receivers. In addition, some additional cost would be borne by the public for a UHF outdoor antenna installation, which is necessary if conversion to UHF is to be generally effective.

Notwithstanding the general availability of all-channel receivers, it is by no means certain, moreover, that an intermixed VHF–UHF system would prove competitively feasible in markets with multiple VHF facilities. Propagation-wide, UHF stations have a shorter service range than VHF stations, and they also suffer from a greater variability in quality of service within their service range, owing to the effects of uneven terrain, tall buildings, and changing atmospheric and foliage conditions. These differences are most apparent to the public in areas where both VHF and UHF stations are in operation and a direct comparison of the two is made. These differences will tend to handicap the UHF stations in their efforts to obtain network affiliation and national advertiser support.

The counter argument may be advanced that these differences between VHF and UHF will become less important in the long run. Reference is made to the AM experience and the presence in the same market of large and small stations. However, the small AM stations have available to them very inexpensive forms of programing which can attract substantial audiences in competition with network-affiliated stations. In the final analysis, the economic prospects for UHF stations in an intermixed VHF–UHF system may depend on the general availability of inexpensive and popular programing fare as well as on the requirement of all-channel receivers.

70-CHANNEL UHF SYSTEM

A fifth alternative considered by the Commission is the assignment of all television stations to the UHF band. This approach presumes that the present VHF–UHF allocation cannot be made to work successfully and that a choice must be made between retaining the 12 VHF or the 70 UHF channels. The merits of an all-UHF system has been extensively debated before your committee since 1954 and the arguments, pro and con, are contained in the records of these hearings and in special staff reports made by and to your committee. In our report of June 1956, we summarized the major benefits which might ensue from an all-UHF system. Among the more obvious of these benefits are: (*a*) No other service would be required to move, (*b*) the frequency requirements of other radio services could be accommodated in the space vacated by the present VHF channel allocation, and (*c*) no international problems would be engendered by the implementation of the existing UHF allocation. Moreover, with 70 channels, there would be adequate opportunity for multiple, competing stations in the larger markets and sufficient assignments available to satisfy the long-run needs of other communities for local outlets.

In our 1956 report, we stated that before a realistic appraisal could be made of the coverage potential of UHF, it would be necessary to ascertain the extent to which UHF transmission and reception could be improved. The Commission at that time called for a program of expedited research and development concentrated on UHF transmitters, receivers, and receiving antennas. Subsequently, various segments of the television industry established the Television Allocations Study Organization. However, as a joint industry group TASO could not undertake equipment research and development programs because of antitrust considerations.

The Commission, as part of its own studies, has sought to ascertain the current status of UHF equipment development. The main findings of this inquiry may be summarized as follows: Research and development in UHF is continuing and some improvements have been made in receiving and transmitting equipment. A major factor deterring rapid technological improvement in UHF is the unfavorable economic outlook for the service. The required improvements involve additional costs for manufacturers, broadcasters, and the public, and there is a natural reluctance to incur these costs under present conditions.

Individual manufacturers have undertaken research and development programs in UHF frequencies which are continuing. In part, these programs have been stimulated by demand from the military and other nonbroadcast users of UHF frequencies. In part, also, these programs stem from the normal

competitive efforts of manufacturers to improve their product, to capture a larger share of the UHF receiver and transmitter markets, and to reduce costs.

Nevertheless, the generally unfavorable economic climate for UHF has retarding effects on the full development and introduction of technical improvements. Over 90 percent of television set production is VHF-only; with the number of operating UHF stations declining, there is little or no expectation of any significant increase in the public demand for UHF receiver. Obviously, these facts are taken into account by manufacturers in deploying their technical personnel and facilities and in laying out their marketing plans. Manufacturers, naturally, are unwilling to add to current price differentials between VHF-only and VHF–UHF receivers, unless the improvements in UHF receivers can be of substantial and obvious benefit to the public.

This may be illustrated in the efforts made to reduce the noise level of UHF tuners. The noise figure for present UHF tuners averages 12.8 to 13.8 decibels; the comparable figure for VHF tuners is 6.5 to 8.5 decibels. The noise level could be reduced in a UHF receiver and set performance improved by incorporation of a radiofrequency amplifier. Several tubes have been engineered for this purpose, including the ceramic tube of GE, the pencil tube of RCA, and a German Pc 86 tube. According to the manufacturers, the best of these devices would reduce the noise level of UHF tuners to the range of 8 to 10 decibels.

It was estimated by the manufacturers, however, that the cost to the public for a VHF–UHF receiver so equipped would average $35–$40 more than the price of a VHF-only receiver, compared to the present differential of $25. This estimate was premised on the most favorable conditions, assuming a nationwide, mass market for UHF receivers. The set manufacturers maintained that the average consumer would not note a reduction in noise level of only 3 to 4 decibels (as compared to the better UHF receivers) and that, in any event, the cost of achieving this improvement was too high.

Some manufacturers were optimistic that a major improvement in UHF receivers may be achieved by the use of transistors, parametric amplifiers, or other semiconductors. The parametric amplifier, which is currently produced for use in nonbroadcast communications, is theoretically capable of reducing the noise level in receivers to zero. Before the parametric amplifier is ready to be applied in commercial television sets, technical changes are required. While certain manufacturers were optimistic that these technical difficulties could be overcome, they estimated the production timetable as at least 3–5 years hence.

While the potential exists for substantial improvements in UHF receiver design, such improvements alone would not equate UHF with VHF service. One of the basic characteristics of radio propagation is that the length of the radio wave decreases as we move upward in the spectrum. This places a greater burden on the receiving antenna to capture the shorter wave. With present-day UHF antennas and transmission lines, the signal delivered ultimately to the UHF receiver may be 10 to 20 decibels less than in the case of VHF transmission. Moreover, UHF receiving antennas are somewhat more directive than VHF antennas. Thus, in order to obtain multiple services from UHF transmitters located in different directions, the UHF set owner in a fringe area is more likely to require a rotary-equipped antenna which would double the cost of the antenna installation. Although the antenna is an important link in the development of a UHF system which would more nearly equate with VHF coverage, there are no major improvements in UHF antenna design in prospect.

The loss in UHF signal capture could be offset in part by a large increase in UHF transmitted power or by an increase in the number of UHF transmitting locations in a given area. With few exceptions, UHF stations currently are operating below the Commission's maxima with respect to transmitter power and antenna height. The major limiting factor is cost. The initial and annual recurring costs rise sharply with increased power. For example, a UHF transmitting system radiating 250 kilowatts ERP can be assembled (exclusive of tower, buildings, studio, studio equipment, and other station facilities) for less than $200,000; by comparison, the cost of transmitter and antenna for a 1-megawatt system is estimated at $280,000, and of a 5-megawatt UHF transmitter system at $740,000. The annual power and tube expenses directly associated with the cost of operating such transmitting equipment similarly rises sharply, from $25,000 for a 250-kilowatt system to an estimated $120,000 for a 5-megawatt system. Obviously, for the great bulk of UHF stations such increased outlays are not warranted at this time.

As an alternative to a single superpower transmitter, it may prove more feasible to extend UHF service by use of multiple transmitters in a polycasting system. This appears to be a promising technique although it has not been field tested as part of a complete system, and it poses certain problems with respect to availability of channels and the commercial identification of the stations in the public mind.

If UHF service is to equate more nearly with VHF service, it appears essential that improvements be introduced from transmitters to receivers. The view has been expressed that the present shortcomings of UHF equipment would be overcome in large measure if the Commission directed a move of all television to the UHF. In support of such a move it is pointed out that other services when moved upward in the spectrum successfully overcame complex equipment obstacles; that UHF appears to operate to the satisfaction of the public in UHF-only areas; that UHF is free from atmospheric interference and man-made interference; and that according to TASO findings in some areas of flat terrain the extent and quality of UHF service equals that of VHF.

Proponents of UHF contend, moreover, that by one means or another the industry would find a way to establish a satisfactory nationwide television system in the UHF. They point to the technical and financial resources of the manufacturers and broadcasters, their success in creating a billion dollar television industry within a decade, and the advances in UHF which are already available. Given an all-pervasive public demand for television service and the high-profit incentives of the industry, UHF proponents contend that a successful transition to UHF inevitably would be made, in the absence of an alternative system.

These arguments are not without merit. It is highly probable, for example, that had television begun in the UHF the public would have found the service acceptable. Moreover, in this proposal as in any other requiring a major shift in allocations, present stations could be required to operate in both bands for a sufficient period to give the public full use of present receivers.

The Commission, however, cannot initiate such a move to the UHF unless and until it has strong evidence that UHF overall can provide service substantially equal to that in VHF without requiring major increased outlays by the average family when purchasing new home receiving equipment. We cannot make such a finding at this time. The Commission is concerned, for example, at the inherent variability of UHF service—the shadowing which results from variable terrain, tall buildings, wooded areas and atmospheric changes. In some extremely flat, treeless areas within line of sight from the transmitters, UHF service may be comparable with VHF. However, if the terrain is moderately rolling or the area contains even moderate vegetation, rocks, houses, or other obstructing, scattering or absorbing objects, the UHF field strength may be substantially lower than VHF for equal ERP. This can result in a deterioration of service to the public in the area, unless adequately compensated for in the UHF transmission system.

Aside from the possible loss or deterioration of service to homes within the normal service areas of UHF stations, we are fearful that the shorter service range of UHF stations will deprive rural areas of service. These scattered rural families are now generally served by VHF stations located in metropolitan centers. Such stations in most cases cover a radius of 60 to 70 miles or more. For the foreseeable future it must be assumed that the coverage area of the typical UHF station would be significantly less than of a VHF station.

The TASO report states that within considerable distances from a television transmitter picture quality as observed in the home remains at approximately the same level, but after a certain distance is exceeded, the home service tends to deteriorate rapidly. The distance at which this occurs depends upon many local factors, but generally is less for UHF than for VHF; moreover, UHF service tends to fall off more sharply and more completely than does VHF service. The report states that some of the reasons for the poorer performance at UHF are basic in their nature and are not susceptible to complete compensation by the application of known techniques.

An individual UHF station may be able to extend its coverage in particular areas by use of boosters or translators. This decision would turn, however, on the licensee's balancing of the costs of such additional coverage as against the number of families which would be added to his audience. The Commission cannot compel a station to provide service which it considers uneconomic, and there is a definite risk that the economic calculus of individual stations may result in the creation of "white" areas.

Eventually, service to these areas may come from the expansion of television stations to the smaller communities and the resultant filling in of signals on an area basis. Instead of relying on the wide-area coverage of distant stations, the public would look to smaller but more numerous local stations for their service.

While we can speculate about these or other means of extending service generally in a UHF system, we cannot overlook: (*a*) The time lag before the necessary improvements would be in actual use, (*b*) the additional cost to the public for improved home equipment, (*c*) the probable loss of national program services to the rural public if it must depend on local stations, and (*d*) the probabilities that some proportion of the television families would be deprived of service.

SUMMARY

We have reviewed for you the advantages and disadvantages of the various alternative solutions to this most difficult problem.

Common to all of these allocation solutions are certain general considerations. One is the long transitional period required to effectuate an allocation change. Any solution permitting television to use effectively more than the present 12 VHF channels necessarily must involve a transition period of perhaps 10 years or longer. This time is required to enable the over 40 million VHF-only set owners to enjoy full use of their present sets before being required to purchase new receivers. In addition, a reasonable conversion period must be granted to the broadcasters and to the nonbroadcast radio spectrum users that may be affected if an allocation revision is made.

A second consideration is the need for all-channel receivers. If a transition from the present television structure is to be successful, it is essential that after a given date all receivers sold to the public should be equipped to receive all television channels. This is necessary to enable broadcasters on any channel assigned to television to reach the public effectively. We have learned from experience, however, that a Commission decision on allocations does not insure necessarily the marketing and sale of all-channel receivers. Cost considerations and other factors may result in the continued production and sale of sets equipped to receive only 12 channels. This is particularly true because during the transitional period operation by present stations on existing channels is likely to continue until an ultimate cutover point is reached.

We, therefore, believe that the Congress should consider a requirement that all sets shipped in interstate commerce shall be equipped to receive all television channels in order to permit an allocations solution. Otherwise, there is a real danger that irrespective of any Commission decision television will continue to be limited effectively to 12 channels.

Two other general factors are involved in the television allocations problem. One is the current proceeding in docket No. 11997, which is designed to ascertain the future requirements of all radio services using spectrum space between 25 and 890 megacycles. This proceeding undoubtedly will affect our conclusions as to the appropriate division of this spectrum space between television and other services.

The other general factor which cannot be overlooked is the dynamic and ever-changing character of the electronic art. Plans devised today for the proper development of television may be affected drastically by innovations in the art tomorrow.

In discussing the specific allocation solutions, we have indicated that an expanded VHF system comprising 50 channels (including the present TV channels 2–12, or alternatively channels 7–12) would satisfy the public interest criteria insofar as television is concerned. It would permit nationwide coverage, competing stations in the major markets, local community stations in the small communities, and adequate outlets for educational needs.

To obtain the additional VHF and contiguous UHF channels requires an exchange of spectrum space with the U.S. Government. A cooperative study of the possibilities in this area has been started jointly by the Commission and the Government (OCDM). In addition, the President has suggested the establishment of a committee to study the uses of the radio spectrum with a view to an improvement in allocations. Also, a study of spectrum usage is being initiated by the House Committee on Interstate and Foreign Commerce. We are hopeful that these studies will be of great assistance in determining the feasibility of an expanded VHF television system.

Inherent in the problem of exchanging spectrum space between the Government and non-Government users are the actual operational requirements of the Department of Defense under the emergency conditions of today. The armed services have developed radio equipment to support these operational requirements based upon the spectrum allocation decision of 1945 which assigned blocs of spectrum space between 25 and 890 megacycles to Government and non-Government services. The Army, Navy, and Air Force have invested many hundreds of millions of dollars in establishing their communications systems in accord with this 1945 decision. It is therefore necessary to give proper consideration to the factors of cost, obsolescence of equipment, and time in which it would be feasible for the armed services to reestablish their communications systems in another portion of the radio spectrum between 25 and 890 megacycles.

Such reallocation would have very substantial international repercussions, as well. The rearrangement of spectrum space undoubtedly would involve conflicts with existing international agreements to which the United States is a party. Renegotiation of such agreements is an extremely delicate and time-consuming process, particularly since it involves international defense communications.

In our current study with the Government looking toward a possible exchange of spectrum space, we are seeking additional space for a total allocation of 50 channels for television. The Government has indicated a cooperativeness and willingness to reconsider the allocation of the spectrum on a long-term basis. Nevertheless, in the balance which must be struck between national defense needs, other services, and television needs, we must consider realistically the possibility of obtaining less than 50 channels. An ideal or ample allocation of spectrum space to television in this area may prove to be infeasible under present world conditions. The Government, for example, may be able to release to television only enough channels to meet a few of the serious deficiencies of the present system. More definite information on this point will come from the study now in progress.

Clearly, congressional assistance will be vital in the reconsideration of the spectrum allocation as between Government and non-Government uses. If, nevertheless, an expanded VHF television system which is preferred by the Commission proves infeasible, there are two allocation alternatives. They are the present 82-channel VHF–UHF system or a 70-channel UHF-only system.

Both of these alternatives have certain advantages. One significant advantage is the present availability of spectrum space for these alternatives, which obviates the need for a costly and complex conversion of Government communication systems.

On the other hand, both of these alternatives also have substantial disadvantages. The effectuation of an 82-channel system depends on nationwide conversion, which can be achieved only by a congressional requirement that all sets shipped in interstate commerce shall be equipped to receive both VHF and UHF channels. Such a statute would not guarantee the success of UHF, but it would remove one of the major obstacles to its success. At the same time it must be recognized that because of the range of frequencies involved between the low VHF and the high UHF, the public probably would be required to pay more for good quality receiving equipment than under an expanded VHF system.

Likewise, a majority of the Commission prefers an expanded VHF system to an all-UHF system because of the greater likelihood under a VHF system of providing adequate nationwide coverage with a smaller number of channels. The Commission cannot move television to the UHF unless and until it has strong evidence that UHF overall can provide service equal to that in VHF without requiring major increased outlays by the public generally. Since evidence is not yet forthcoming, although as we pointed out there have been some developments which show promise.

We are hopeful that within the next few months we will know whether an expanded VHF system is a feasible eventuality. However, as we have emphasized, the implementation of this allocation solution, or of any other, will require a long transitional period.

Meanwhile, some interim action is clearly needed. The Commission is of the view that immediate steps must be taken to remedy the critical shortages of facilities in a number of important population centers. Characteristically, these markets have only one or two VHF stations and little or no UHF set conversion. The only practicable short-run solution in these cases is to add VHF assignments, even if this requires less than our minimum spacing requirements. Only in this way can be obtain sufficient competitive outlets to serve the public interest.

This interim policy must be carefully circumscribed to be consistent with our long-range allocation policy. It must be focused on alleviating only the most critical shortages.

If the future allocation solution lies in an expanded VHF plan, the Commission will have the opportunity in the future to delete any short spacings which are required immediately. A similar opportunity to remove short spacings would be present if the long-range solution must be sought in a practicable 82-channel VHF–UHF system or in an all-UHF system. If, however, none of these alternatives proves feasible, and we must rely on the 12 VHF channels then the number of short separations will inevitably increase.

A limited short-range program of adding VHF assignments at the necessary spacings can probably be engineered to avoid serious deterioration in the general availability of television service. To this end television stations may have to utilize directional antennas, precision offset, and such other techniques as the Commission may require in the public interest.

Currently, the Commission is exploring the most feasible and expeditious procedures for achieving this interim approach. We expect within a short time to initiate the necessary rulemaking proceedings.

We are hopeful that our discussions of this matter today will not result in a flood of petitions for rulemaking on this subject, at least until we can complete our work on the notice of the proposal we intend to publish.

We appreciate the opportunity you have given us to explain in detail the status of our consideration of the allocation problem. We are continuing to give this matter high priority, both at the Commission and at the staff level, and we are hopeful that in the near future we can arrive at an appropriate solution in the public interest.

SEPARATE STATEMENT OF COMMISSIONER BARTLEY

I am prepared to go along with the statement except that I think the proposal for interim action is premature.

The interim action proposed is to remedy the critical shortages of facilities in a number of important population centers (major TV markets) with only one or two commercial VHF stations.

Addition of VHF assignments at reduced mileage separation will, in my judgment, substantially prejudice any long-range program other than an all VHF system.

This step is being taken at a time when the majority believes that within the next few months we will know whether or not an expanded VHF system is feasible eventually.

If an expanded VHF system is feasible eventually, the first areas which should be provided for are those areas without VHF service, then those with a single VHF service, and so on.

If an expanded VHF system is not feasible eventually, the interim plan should mesh with the long-range plan, and it may well be that a more vigorous program of deintermixture toward UHF markets is the only such solution.

STATISTICAL APPENDIX

TABLE 1.—*Television station data as of Jan. 23, 1960*

	Total	Commercial	Noncommercial
VHF stations:			
On the air	476	442	34
Not on the air	42	35	7
Total authorized	518	477	41
UHF stations:			
On the air	88	77	11
Not on the air	128	113	15
Total authorized	216	190	26
All stations:			
On the air	564	519	45
Not on the air	170	148	22
Total authorized	734	667	67

TABLE 2.—*Analysis of commercial television station grants made since July 1952 (as of Jan. 23, 1960)*

	VHF	UHF	Total
Total postfreeze CP's issued	419	373	792
Number canceled:			
Before going on air	42	132	174
After going on air	7	51	58
Total	49	183	232
Number outstanding:			
On the air	335	77	412
Not on air:			
(*a*) Had been on the air but now off the air	1	44	45
(*b*) Never on the air	34	69	103
Total	370	190	560

SUMMARY

Total stations that went on the air	343	172	515
Number of stations now off the air:			
Number	8	95	103
Percent	2.3	55.2	20.0

TABLE 3.—*Number of postfreeze commercial TV stations in operation, July 1952 through Jan. 23, 1960*

Time period	Number of VHF stations			Number of UHF stations		
	Going on the air	Going off the air	Total on air end of period	Going on the air	Going off the air	Total on air end of period
July 1952–December 1953	121	1	120	123	2	121
January–December 1954	69	3	186	25	29	117
January–December 1955	49	0	235	9	27	99
January–December 1956	37	0	272	6	14	91
January–December 1957	28	0	300	12	19	84
January–December 1958	27	2	325	4	11	77
January–December 1959	13	4	334	10	11	76
January–January 23, 1960	1	0	335	1	0	77
Total [1]	343	8	335	172	95	77

[1] These columns do not add to the totals shown since some stations went on the air and off the air more than once. The totals reflect the number of different stations which went on the air or off the air during the entire period.

TABLE 4.—*Analysis of commercial UHF operating experience, by type of TV market (as of Jan. 23, 1960)*

	Number of TV markets	Percent of total
1. All TV markets in which UHF went on the air	117	100
All UHF stations have gone off the air	62	53
Some UHF stations have gone off the air and some are still on the air	10	9
All UHF stations are still on the air	45	38
A. TV markets which are UHF only [1]	53	100
All UHF stations have gone off the air	21	39
Some UHF stations have gone off the air and some are still on the air	3	6
All UHF stations are still on the air	29	55
B. TV markets which are UHF-VHF [1]	64	100
All UHF stations have gone off the air	41	64
Some UHF stations have gone off the air and some are still on the air	7	11
All UHF stations are still on the air	16	25
2. The 64 UHF-VHF markets classified by whether UHF operation was before or after VHF:		
A. UHF before VHF	29	100
All UHF stations have gone off the air	16	55
Some UHF stations have gone off the air and some are still on the air	4	14
All UHF stations are still on the air	9	31
B. UHF after VHF	35	100
All UHF stations have gone off the air	25	71
Some UHF stations have gone off the air and some are still on the air	3	9
All UHF stations are still on the air	7	20

[1] These classifications refer only to the types of assignments available in the immediate TV market, i.e., whether such assignments are UHF only or both UHF and VHF.

TABLE 5.—*Annual volume of advertising in United States for selected years, 1949–58*

A. MILLIONS OF DOLLARS

Media	1949	1952	1955	1958
Newspapers	1,915	2,472	3,088	3,193
Magazines	493	616	729	767
TV	58	454	1,025	1,354
Radio	571	624	545	616
All other [1]	2,165	2,990	3,807	4,372
Total	5,202	7,156	9,194	10,302

B. PERCENT OF TOTAL

Newspapers	36.8	34.5	33.6	31.0
Magazines	9.5	8.6	7.9	7.5
TV	1.1	6.3	11.2	13.1
Radio	11.0	8.7	5.9	6.0
All other [1]	41.6	41.9	41.4	42.4
Total	100.0	100.0	100.0	100.0

[1] Includes farm publications, direct mail, business papers, outdoor advertising, weekly newspapers, transportation advertising, cost of company advertising departments, etc.

Source: "Printers' Ink Advertisers Guide to Marketing for 1960."

TABLE 6.—*Volume of national and local advertising by media, 1958*

A. MILLIONS OF DOLLARS

Media	Total	National	Local
Newspaper	3,193	769	2,424
Magazines	767	767	
Television	1,354	1,106	248
Radio	616	248	368
All other [1]	4,372	3,441	931
Total	10,302	6,331	3,971

B. PERCENT OF TOTAL

Newspapers	31.0	12.1	61.0
Magazines	7.5	12.1	
Television	13.1	17.5	6.3
Radio	6.0	3.9	9.3
All other [1]	42.4	54.4	23.4
Total	100.0	100.0	100.0

[1] Includes farm publications, direct mail, business papers, outdoor advertising, weekly newspapers, transportation advertising, cost of company advertising departments, etc.

Source: Printers' Ink Advertisers Guide to Marketing for 1960.

TABLE 7.—*Total television set production showing number and percent equipped with UHF tuner, 1953–59*

Year	Total TV set production	With UHF tuner	
		Number	Percent
1953	7,214,787	1,459,475	20.2
1954	7,346,715	1,383,486	18.8
1955	7,756,521	1,181,788	15.2
1956	7,387,029	1,035,236	14.0
1957	6,399,345	779,800	12.2
1958	4,920,428	418,256	8.5
1959	6,349,380	435,571	6.9
Total	47,374,205	6,693,612	14.1

NOTE.—The above total of 6,693,612 UHF sets represents only factory-equipped UHF sets and does not include VHF-only sets which were converted by local servicemen to receive UHF either by the addition of a converter or a strip. Although no precise estimate has ever been made of the number of sets converted locally, there are indications that the number of such sets would not be greatly in excess of 2 million. Thus, total sets that have been equipped for UHF (whether or not they are now being used to receive UHF) can be estimated at approximately 8.5 million.

Source: EIA.

TABLE 8.—*Analysis of non-TV homes*

The March 1958 study by Advertising Research Foundation estimated that 8,140,000 households (16 percent of the total) did not own TV sets. It cannot be concluded from this that such homes lacked TV service since it was found that about half of the non-TV homes (4.1 million) were located in counties where total TV set ownership was 80 percent or better. The following table shows the distribution of non-TV homes by the various levels of TV set ownership in the county:

	Non-TV homes	Percent of total non-TV homes
Counties with TV set ownership of:	*Millions*	
90 percent or over	1.9	23.9
80 percent or over	4.1	49.9
70 percent or over	5.3	64.9
60 percent or over	6.4	78.9
50 percent or over	7.6	92.9
34 percent or over [1]	8.1	100.0

[1] No county was estimated to have less than 34 percent TV set ownership.

TABLE 9.—*Bureau of Census projections of population, 1960–80*

[In millions]

	Low estimate	High estimate
On July 1:		
1960 [1]	179.4	181.2
1970	202.5	219.5
1980	230.8	272.6

[1] Population as of Jan. 1, 1960—179.3 million.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Alabama	Birmingham	2		1	
	Decatur		1		
	Dothan	1			
	Florence		1		
	Mobile-Pensacola, Fla	3			
	Montgomery	1	1		
	Huntsville		1		
Arizona	Phoenix-Mesa	4			
	Tucson	3		1	
	Yuma	1			
Arkansas	El Dorado	1			
	Fort Smith	1			
	Little Rock-Pine Bluff	3			
California	Bakersfield	1	2		
	Chico-Redding	2			
	Eureka	2			
	Fresno, Tulare	1	2		
	Los Angeles	7			
	Sacramento-Stockton	3	1	1	
	Salinas-Monterey	1			
	San Diego	2			
	San Francisco-Oakland	4		1	
	San Jose	1			
	San Luis Obispo	1			
	Santa Barbara	1			
Colorado	Colorado Springs-Pueblo	3			
	Denver	4		1	
	Grand Junction	1			
	Montrose	1			
Connecticut	Bridgeport		1		
	Hartford-New Haven-New Britain-Bristol	2	2		
	Waterbury		1		
District of Columbia	Washington	4			
Florida	Fort Myers	1			
	Jacksonville	2		1	
	Miami-Fort Lauderdale	3		1	
	Orlando-Daytona Beach	3			
	Panama City	1			
	Tampa-St. Petersburg	2	1	1	
	West Palm Beach	2			
Georgia	Albany	1			
	Atlanta	3			1
	Augusta	2			
	Columbus	1	1		
	Macon	1			
	Savannah	2			
	Thomasville-Tallahassee, Fla	1			
Idaho	Boise	2			
	Idaho Falls-Pocatello	2			
	Lewiston	1			
	Nampa	1			
	Twin Falls	1			
Illinois	Champaign-Urbana	1	1	1	
	Chicago	4		1	
	Danville		1		
	Harrisburg	1			
	La Salle		1		
	Peoria		3		
	Quincy-Hannibal, Mo	2			
	Rockford	1	1		
	Springfield-Decatur		2		

See footnote at end of table, p. 4608.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Indiana	Evansville-Henderson, Ky	1	2		
	Fort Wayne		3		
	Indianapolis-Bloomington	4			
	Lafayette		1		
	Muncie		1		
	South Bend-Elkhart		3		
	Terre Haute	1			
Iowa	Cedar Rapids-Waterloo	3			
	Davenport-Rock Island-Moline	2			
	Des Moines-Ames	3		1	
	Fort Dodge		1		
	Sioux City	2			
Kansas	Ensign	1			
	Garden City	1			
	Goodland	1			
	Great Bend	1			
	Hays	1			
	Topeka	1			
	Wichita-Hutchinson	3			
Kentucky	Lexington		2		
	Louisville	2			1
	Paducah	1			
Louisiana	Alexandria	1			
	Baton Rouge	1	1		
	Lafayette	1			
	Lake Charles	1	1		
	Monroe	1		1	
	New Orleans	3		1	
	Shreveport	2			
Maine	Bangor	2			
	Portland-Poland Spring	3			
	Presque Isle	1			
Maryland	Baltimore	3			
	Salisbury		1		
Massachusetts	Adams		1		
	Boston	3		1	
	Greenfield		1		
	Springfield-Holyoke		2		
	Worcester		2		
Michigan	Cadillac	1			
	Detroit	3			1
	Flint-Lansing-Saginaw-Bay City	3	1		
	Grand Rapids-Kalamazoo	2			
	Marquette	1			
	Traverse City	1			
	Onondaga	1		1	
	Cheboygan	1			
Minnesota	Alexandria	1			
	Austin-Rochester-Mason City, Iowa	3			
	Duluth-Superior, Wis	2			
	Minneapolis-St. Paul	4		1	
Mississippi	Columbus	1			
	Greenwood	1			
	Jackson	2			
	Meridian	1			
	Tupelo	1			
	Laurel	1			
Missouri	Cape Girardeau	1			
	Columbia-Jefferson City	2			
	Joplin-Pittsburg, Kans	2			
	Kansas City	3			
	Kirksville-Ottumwa, Iowa	1			
	St. Joseph	1			
	St. Louis	4		1	
	Sedalia	1			
	Springfield	2			
Montana	Billings	2			
	Butte	1			
	Great Falls	2			
	Glendive	1			
	Helena	1			
	Missoula	1			

See footnote at end of table, p. 4608.

TABLE 10.—*Listing of 272[1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Nebraska	Hay Springs	1			
	Hayes Center	1			
	Hastings	1			
	Kearney	1			
	Lincoln	1		1	
	North Platte	1			
	Omaha	3			
	Scottsbluff	1			
	McCook	1			
Nevada	Las Vegas-Henderson	3			
	Reno	1			
New Hampshire	Manchester	1			
New Mexico	Albuquerque	3		1	
	Carlsbad	1			
	Clovis	1			
	Roswell	1			
New York	Albany-Schenectady-Troy	3			
	Binghamton	1	1		
	Buffalo-Niagara Falls	3			1
	Carthage-Watertown	1			
	Elmira		1		
	New York	7			
	Plattsburg-Burlington, Vt	2			
	Rochester	2			
	Syracuse	2			
	Utica-Rome	1			
North Carolina	Charlotte	2			
	Greensboro-High Point-Winston-Salem	2			
	Greenville-Washington	2			
	Raleigh-Durham	2			
	Wilmington	1			
North Dakota	Bismarck	2			
	Dickinson	1			
	Fargo	2			
	Grand Forks	1			
	Minot	2			
	Valley City	1			
	Williston	1			
Ohio	Akron		1		
	Cincinnati	3			1
	Cleveland	3			
	Columbus	3			1
	Dayton	2			
	Lima		1		
	Toledo	2			
	Youngstown-New Castle, Pa		3		
	Zanesville		1		
Oklahoma	Ada	1			
	Ardmore	1			
	Lawton	1			
	Oklahoma City-Enid	3		1	1
	Tulsa	3		1	
Oregon	Eugene	1			
	Klamath Falls	1			
	Medford	1			
	Portland	3			
	Roseburg	1			
Pennsylvania	Altoona-Johnstown	2	1		
	Erie	1	1		
	Harrisburg-Lancaster-York-Lebanon	1	4		
	Philadelphia	3			1
	Pittsburgh	3		1	1
	Wilkes-Barre-Hazleton-Scranton		3		
Rhode Island	Providence	2			
South Carolina	Anderson		1		
	Charleston	2			
	Columbia	1	1		
	Florence	1			
	Greenville-Spartanburg-Asheville, N.C	3	1		
South Dakota	Aberdeen	1			
	Florence	1			
	Reliance	1			
	Rapid City	2			
	Sioux Falls	1			
	Deadwood	1			

See footnote at end of table, p. 4608.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Tennessee	Bristol-Johnson City	2			
	Chattanooga	3			
	Jackson	1			
	Knoxville	2	1		
	Memphis	3		1	
	Nashville	3			
Texas	Abilene-Sweetwater	2			
	Amarillo	3			
	Austin	1			
	Beaumont-Port Arthur	2			
	Big Spring	1			
	Brownsville-Harlingen-Weslaco	2			
	Bryan-College Station	1			
	Corpus Christi	2			
	Dallas-Forth Worth	4			
	El Paso	3			
	Galveston-Houston	3		1	
	Laredo	1			
	Lubbock	2			
	Lufkin	1			
	Monahans	1			
	Odessa-Midland	2			
	San Angelo	1			
	San Antonio	3	1		
	Texarkana	1			
	Tyler	1			
	Waco-Temple	2			
	Wichita Falls	2			
Utah	Salt Lake City-Provo	4		1	
Vermont	(see New York)				
Virginia	Harrisonburg	1			
	Norfolk-Portsmouth-Newport News-Hampton.	3			
	Richmond-Petersburg	3			
	Roanoke-Lynchburg	3			
Washington	Bellingham	1			
	Ephrata		1		
	Kennewick-Richland-Pasco		1		
	Seattle-Tacoma	5		1	
	Spokane	3			
	Yakima		2		
	Walla Walla		1		
West Virginia	Charleston-Oak Hill-Huntington-Ashland, Ky.	4			
	Clarksburg	1			
	Bluefield	1			
	Parkersburg		1		
	Wheeling-Steubenville, Ohio	2			
Wisconsin	Eau Claire	1			
	Green Bay-Marinette	3			
	La Crosse	1			
	Madison	1	2		1
	Milwaukee	3		1	
	Wausau	1			
Wyoming	Casper	2			
	Cheyenne	1			
	Riverton	1			
Alaska	Anchorage	2			
	Fairbanks	2			
	Juneau	1			
Hawaii	Hilo	1			
	Honolulu	3			
	Wailuku	3			
Puerto Rico	Mayaguez	1			
	Ponce	2			
	San Juan	2		1	
Guam	Agana	1			

[1] The 268 TV markets have a total of 509 commercial (434 VHF and 75 UHF) and 37 noncommercial stations (27 VHF and 10 UHF) in operation. In addition, the following 5 TV markets have only 1 noncommercial VHF station in operation: Andalusia, Ala.; Munford, Ala.; Gainesville, Fla.; Chapel Hill, N.C.; and Corvallis, Oreg.

APPENDIX B

TV PLANNING PARAMETERS

TV planning parameters

Item:													
1	Height above average terrain.	750 feet											
2	Frequency band	54–88 mc (5 channels)			174–324 mc (25 channels)			174–474 mc (50 channels)			470–890 mc (70 channels)		
3	Geometric mean frequency.	69 mc			240 mc			290 mc			650 mc		
4	Power (ERP)	20 dbk (100 kw)			25 dbk (316 kw)			27 dbk (500 kw)			30 dbk (1,000 kw)		
5	Picture quality	Gr. 2	Gr. 3	Gr. 4	Gr. 2	Gr. 3	Gr. 4	Gr. 2	Gr. 3	Gr. 4	Gr. 2	Gr. 3	Gr. 4
6	Service grade	Pri.	Sec.	Fri.	Pri.	Sec.	Fri.	Pri.	Sec.	Fri.	Pri.	Sec.	Fri.
7	Thermal noise (dbu @ 300 ohms)	7	7	6	7	7	6	7	7	6	7	7	6
8	Receiver noise figure (db)	7	6	5	10	8	6	11	9	7	12	10	9
9	Required vis. peak noise ratio (db)	36	27	23	36	27	23	36	27	23	36	27	23
10	Transmission line loss (db)	2	2	2	3	3	3	4	4	4	5	5	5
11	Receiving ant loss (db)	−3	−4	−7	−3	−5	−10	−5	−7	−12	−8	−10	−14
12	Dipole factor (db) ($-20\text{Log}\frac{96.5}{f_{mc}}$)	−3	−3	−3	8	8	8	10	10	10	17	17	17
13	Location probability (L) (percent)	70	50	50	70	50	50	70	50	50	70	50	50
14	Req. local field F (L, 90) (dbu)	46	35	26	61	48	36	63	50	38	69	56	46
15	Loc. probability factor R(L) (db)	3	0	0	4	0	0	5	0	0	6	0	0
16	Req. Median field F(50, 90) (dbu)	49	35	26	65	48	36	68	50	38	75	56	46
17	Service range (mi) (noise limited)	50	74	110	38	58	72	33	51	67	26	40	48
18	Co-channel S/I ratio (db)	36	24	20	36	24	20	36	24	20	36	24	20
19	Adj. channel S/I ratio (db)	−22	−26	−31	−22	−26	−31	−22	−26	−31	−22	−26	−31
20	Rec. ant. front/back ratio (db)	3	4	7	3	5	10	5	7	12	8	10	14
21	Dist. to co-ch lim (mi) (S=215 mi)	38.5	57	65	>38	>58	69	>33	>51	>67	>26	>40	>48
22	Dist. to adj-ch lim (mi) (S=100 mi)	>50	67.5	74	>38	>58	>72	>33	>51	>67	>26	>40	>48

EXPLANATION OF TV PLANNING ITEMS

1. Transmitting antenna height: The value selected (750 feet) is considered typical for all channels.

2. Frequency band: The bands selected are related to the several TV allocation plans under consideration. Subsequent items, tabulated for 174–234 megacycles were assumed to be the same for the present high-VHF band.

3. Geometric mean frequency: This is the center frequency (percentagewise) of each band. It is the nominal frequency of each band, on which the respective parameters are based.

4. Power (ERP): The power listed is the assumed ceiling power for each band, except the 470–890-megacycle band where it is assumed that 1,000 kilowatts is the maximum practicable value for planning purposes at this time.

5. Picture quality: This is the subjective quality of the picture as seen by the viewer. It is expressed according to the following scale as used by TASO.

Grade	Name	Description
1	Excellent	The picture is of extremely high quality, as good as you could desire.
2	Fine	The picture is of high quality providing enjoyable viewing. Interference is perceptible.
3	Passable	The picture is of acceptable quality. Interference is not objectionable.
4	Marginal	The picture is poor in quality and you could improve it. Interference is somewhat objectionable.
5	Inferior	The picture is very poor but you could watch it. Definitely objectionable interference is present.
6	Unusable	The picture is so bad that you could not watch it.

6. Service grade: Three grades of service are designated as follows:

Service grade	*Description*
Primary	A Grade 2 (Fine) picture can be obtained in at least 70 percent of receiving locations with a simple roof top receiving antenna installation.
Secondary	A Grade 3 (Passable) picture can be obtained in at least 50 percent of locations with a moderately good receiving installation.
Fringe	A Grade 4 (Marginal) picture can be obtained in at least 50 percent of receiving locations with a very good receiving installation.

The receiving antenna height assumed in each case is 30 feet. It is recognized that viewers may improve their picture quality by installing higher antennas, or higher gain antennas than assumed in defining grades of service. Also the percentage of locations receiving at least the assumed picture quality may be increased if those locations receiving inferior pictures install better receiving equipment than assumed.

7. Thermal noise: This is the computed thermal noise level in dbu across 300 ohms assuming receiver i.f. bandwidth of 4 Mc for primary and secondary service, (allowing for color) and 3.3 Mc for fringe service.

8. Receiver noise figure (db): These assumed noise figures are based on assumed fair, average and good receiver characteristics for primary, secondary, and fringe service, respectively.

9. Required/visual peak/noise ratio (db): The values listed were taken from the TASO Panel 6 final report.

10. Transmission line loss (db): The listed values were derived from the TASO Panel 2 final report for 30 feet of line. The figures listed correspond approximately to the average values for 5-year-old line when wet. It is recognized that better line may be used in poor locations.

11. Receiving antenna loss (db): The values listed are relative to a half-wave dipole, negative values indicating gain. These values correspond approximately to the minimum, average and maximum antenna gains for primary, secondary and fringe service, respectively as reported by TASO on the basis of questionnaire returns. For fringe area installation, separate antennas or a rotor may be required if stations in different cities are to be received.

12. Dipole factor (db): The dipole factor is the ratio, in db, of the signal field strength to the signal voltage delivered by a half-wave dipole at a 300-ohm

load. This factor is added to the antenna terminal voltage at the receiver to obtain the field strength which will produce that voltage when using a dipole antenna.

13. Location probability (L): This is the percentage of locations at which the assumed quality of picture is equalled or exceeded. It is one of the basic criteria for defining grades of service.

14. Required local field (dbu): This is the field strength required at any receiving location. It is obtained by adding (algebraically) the values in items 7, 8, 9, 10, 11, and 12 for the respective columns. 90 percent time availability has been selected as a standard.

15. Location probability factor R(L) (db): This is the number of db which must be added to item 14 in order to obtain the value of field strength at the median location (F(50, 90)) which is necessary in order to have at least the required local field at 70 percent of locations. The values listed for R(L) were obtained from Fig. 10 of T.R.R. Report 2.4.16, used for Appendix "A" of the June, 1956, Order in Docket 11532.

16. Required location median field F(50, 90) (dbu): This is the field strength exceeded at 50 percent of locations for at least 90 percent of time, for the specified service grade.

17. Service range (noise limited) (mi): These distances are derived from the propagation curves (F(50,90)) used in T.R.R. Report 2.4.16. These distances apply in case there is no interference from other stations. For 240 Mc, the 195 Mc curves were used. For 290 Mc, interpolated curves were drawn using the 195 and 700 Mc. The 700 Mc values were used for the UHF band.

18. Co-channel signal/interference ratio (db): These values were obtained by analysis of the summaries of experimental data given in the TASO Panel 6 report. These data were obtained from subjective observations of a large number of persons, for the several grades of picture quality. The listed values are the averages of the data for (non-precise) offset frequencies of 9985 cps and 19,995 cps.

19. Adjacent channel signal/interference ratio (db): These values were obtained by TASO from their analysis of the experimental subjective data, as reported by Panel 6.

20. Receiving antenna front/back ratio (db): The receiving antenna is assumed to have a response equal to a dipole in the back directions. Accordingly, the listed values are equal to the assumed receiving antenna loss (Item 11). These values are generally less than given by TASO for antennas but the reduction is considered necessary to include effects of surrounding objects in a normal installation.

21. Distance to co-channel limitation (mi): For the average co-channel separation (215 mi) the distance to the co-channel interference limited service range was computed using the formula given in the Ad Hoc Committee Report. The acceptance ratio (A) given in item 18 was reduced by subtracting the front/back ratio of the receiving antenna (item 20). The propagation data used for these computations are those used in T.R.R. report 2.4.16 for "Appendix A."

22. Distance to adjacent channel limitation (mi): For the average adjacent channel separation (100 mi), the distance to the interferene limited service range was computed using the formula given in Item 19 was reduced by subtracting the front/back ratio of the receiving antenna (Item 20). The propagation data used are those used in T.R.R. Report 2.4.16 for "Appendix A."

(The following represents the resumption of Chairman Doerfer's oral testimony at the current hearing:)

Mr. DOERFER. And I would like to supplement it by briefly summarizing the significant developments since last April when the report was submitted.

There has been little change with respect to the number of stations operating, the preponderant use of available VHF channels, the current use of only a comparatively small number of the UHF channels assigned to large and small communities throughout the Nation, or in the underlying difficulties which have until now severely inhibited the fuller use of the 70 UHF channels allocated to television in 1952. Such changes as have occurred in the numbers of services are reflected

in updated tables which I request leave to offer for your record at the conclusion of this statement.

The developments which I believe may be of more interest to your committee, because they affect the possibilities for remedial action looking toward both long-range and more immediate improvement in television allocations, concern the alternative long-range policies discussed in my previous report, and the plan of "interim" action envisaged in that report.

You will recall, Mr. Chairman, that last April, having concluded that the underlying problem here could not be satisfactorily solved on a nationwide scale either with the exclusive use of the 12 VHF channels (on which 85 percent of the currently operating commercial stations are now assigned) or through deintermixing the VHF and UHF assignments to individual cities, the Commission had under consideration five alternative long-range possibilities as follows:

(1) A 50-channel VHF system, retaining the present 12 VHF channels.

(2) A contiguous 50-channel VHF system, retaining the present channels 7 through 13 and withdrawing from television use channels 2 through 6.

(3) A contiguous 25-channel VHF system, retaining channels 7 through 13.

(4) A 70-channel all-UHF system.

(5) The present 82-channel VHF–UHF system.

Four of these five approaches contemplated the use of a continuous band of frequencies, three in the VHF portion of the spectrum, and the other, an all-UHF system. The remaining alternative under consideration was the present system of employing the present 82 channels, of which 12 are in the VHF band and 70 in the UHF.

Each of the three all-VHF systems now under study contemplated the reallocation to television of frequencies now allocated to and used by other services—predominantly Government services, including the military. Because of the advantages attaching to the use of a continuous band employing all or some of the VHF frequencies now utilized on such a wide scale for the Nation's television service, the Commission has diligently pursued discussions with the Office of Civil and Defense Mobilization (OCDM) for the purpose of ascertaining the practical possibilities for the Government services now utilizing certain VHF frequencies to shift to other portions of the spectrum.

With your leave, Mr. Chairman, I will at the conclusion of this statement ask Commissioner Ford, who has represented the Commission in the discussions with OCDM, to summarize for you the status of those discussions.

Senator PASTORE. Before you go any further, if you considered alternatives one, two, three, and four, would that entail any changing of sets on the part of the viewer?

Mr. DOERFER. Yes, it would; but I do not think it would be quite as difficult or as expensive.

Mr. COX. Is it not also true that the three approaches which you suggest as being all-VHF employ substantial portions of the UHF frequencies? In other words, the 50 contiguous channels would be, in one case, about half from the VHF portion of the band and half from the UHF portion, is that not true?

Mr. DOERFER. That might be, Mr. Cox, but you have to remember the line between the VHF and UHF is an arbitrary one; and you have to remember that trying to build a set today which will extend from channel 2, starting at what, 56 megacycles, and then trying to bridge that gap, the Government service, and then jumping up into UHF, away in the last channel, is quite a substantial mechanical undertaking and, obviously, much more expensive than a continuous set. I do think, with respect to this, if we could get these VHF's in a continuous band we would have much less dislocation.

Senator PASTORE. That is a relative term. That is actually the biggest problem of all—the reaction on the part of the public when you begin to do these things, which will entail the expenditure of money which they do not have to spend now, because the situation is such, just as you brought out, the great majority of the American people, because they live in the congested areas, are receiving a satisfactory amount of television service. There is no question about that at all.

The problems have arisen in cases where you either get into the fringe areas or the rural sections or the shadowy parts that you have been discussing. I would like to get a more definite answer, if you can get it for us now or at a later date, just what expense this entails on the part of the viewer, or what attitude he is going to take to it, or if there is something that can be done so he can live with his present set until it is worn out and he can get a new one that will meet the new situation. I realize you have got a dilemma when you get to this part.

Mr. DOERFER. In answer to the first part of your question, Mr. Chairman, you have to remember the AM expanded that way, but it expanded in a continuous band. It is quite different to get a set with an AM and FM because of, as you know, the differential in cost. And yet let me repeat the most peculiar observation I heard the other day—it cost about as much to convert to UHF as it does today to provide for an FM receiver, and people are not going to do that.

Last year we had an increase of 100 applications in the FM, and maybe this thing will get off the ground. I am satisfied if the automobile manufacturers once put an FM set in a car—which as we all know, is better reception from the technical viewpoint—we have got it made, as far as FM is concerned. What particular thing may develop in television broadcasting which is going to make the UHF set more acceptable to the public, I do not know. But it is quite possible.

Senator PASTORE. No, but the question I asked specifically is this: Mechanically is this feasible? I do not know whether it is or not. I am not an engineer. I am not a technician at all. Would this thing be worked in such a way the present set would do, even while the transition is going on?

Mr. DOERFER. I am going to offer that. I have got it in there, and if I do not, I will certainly answer that.

Senator PASTORE. All right, then I shall not interrupt you now.

Mr. DOERFER. As your committee is aware, the propagation and reception characteristics of television signals are basic to any scheme of TV allocations. Of considerable interest in this regard is the experimental operation authorized by the Commission last December, for the airborne transmission of television signals on four of the upper UHF channels. This project, which has been undertaken at a cost of $7 million by Purdue University with financial aid of the Ford

Foundation to ascertain the feasibility of this technique for inschool use of television, is expected to produce important indications of the capacity of airborne transmitters to deliver usable signals in an area ranging from 150 to 200 miles from the vicinity of the transmitting aircraft. Additionally, the operation will experiment with the use of channels narrower than the 6 megacycles now standard for television transmission.

It is hoped that this operation will throw useful light on the possibilities for improving transmission of UHF signals, about which most Commissioners feel that more must be learned before reliable assessment could be made of the possibilities for a nationwide UHF service. Another long-range development which the Commission is watching with interest is the experimentation which the Government has announced, using satellites in the propagation of radio signals.

It may be useful at this point to refer briefly to the view expressed in my report of last April concerning the need, under any of the alternative approaches under consideration, for legislation which would seek to eliminate, or at least reduce, the distribution of television sets capable of receiving only the 12 VHF channels now allocated to television broadcasting. Irrespective of whether a single band system were to employ UHF frequencies or a continuous band of VHF frequencies, or whether both bands would be employed, one of the urgent needs is to insure the widest possible availability to the public of sets capable of receiving signals on all the channels allocated to television broadcasting. As this committee is aware, one of the factors which has severely inhibited the development of UHF television broadcasting is the relative dearth of receivers capable, without modification, of utilizing UHF signals.

Similar considerations apply, in our view, to the successful implementation of any allocation plan employing more than the 12 VHF channels now allocated to television. Because the Commission regards this matter as crucially important, I am submitting with this statement a suggested draft of legislation which would empower the Commission to establish minimum standards for television broadcast receivers manufactured for resale in interstate commerce. If it were given such power the Commission would be in a position to take effective steps toward relieving the critical problem of receiver incompatibility. As I have already said, a measure of this kind appears to be critically important to the success of whichever of the five long-range plans may ultimately be adopted.

Associated with this suggestion is the Commission's continued endorsement of proposals to eliminate or reduce the disparity between the cost to the public of 12-channel receivers and the cost of all-channel receivers, by removing the 10-percent Federal excise tax from the sale, by manufacturers, of sets capable of receiving, without modification or conversion, signals on all channels allocated to television broadcasting.

Senator PASTORE. Have you developed that in the way of constitutionality? Have you any brief on this as to whether the legislation would be constitutional? I mean, what would be your right, under the power over interestate commerce, to regulate such a thing? This is no standard that has to do with safety. It is not a standard that has to do with public welfare.

Mr. DOERFER. Well, Senator, I have not really given that too much consideration. I do know——

Senator PASTORE. I would be interested. I see Mr. Fitzgerald; perhaps he can help us.

Mr. FITZGERALD. We have studied the matter, Mr. Chairman. We realize that there are questions in it. However, considering the fact that its crucial importance might vary demonstrably in attaining a complete television service to all the public throughout the Nation, and that this power might be of essential value to bringing to the entire public a nationally competitive television service, we are disposed to think that such legislation, if adopted, would be constitutional.

Senator MONRONEY. Could I ask a question right there, Mr. Fitzgerald? As I understand it, I believe there are only three VHF channels reserved for educational use in the area east of the Mississippi to the Atlantic Ocean, bounded on the south by the Ohio River, yet here you have the great mass of the adult population you can reach with educational TV, but you have no VHF channels that could serve them. Would it be possible, in the interest of education, to waive the 10-percent tax if the sets were available or capable of receiving educational programs?

Mr. FITZGERALD. As a lesser application of the same thought.

Senator MONRONEY. That is right, looking forward to educational TV and the benefits that would flow from it if you have mass receivers capable of receiving UHF stations, on which most of your educational broadcasting will have to be done, in this great population area where all the V's got away, practically. Would it be possible to exempt them, if they are capable of receiving the educational band, from your 10-percent tax?

Mr. FITZGERALD. Sir, I think your question also would contemplate similar situations throughout other parts of the country.

Senator MONRONEY. Indeed it would. But I am using this as an illustration of the problems that we have, and there might be others in other centers where you might need two or three new stations. Many of them have bought up bankrupt UHF stations and in some cases are using them only to pipe the TV instruction into the schools.

Mr. FITZGERALD. Yes. As you know, the Commission in the past, some time ago, suggested an excise exemption in a broader way. I think while, as I say, there may be constitutional problems, I think it would be a feasible suggestion to consider.

Senator MONRONEY. In other words, it might be unconstitutional if the removal was discriminatory in favor of the U and against the V, but if the development of educational TV must go forward, and I think it must, then you would have a national purpose for this differential, and a tax reason.

Mr. FITZGERALD. Sir, I did not mean to imply that there might be a discrimination, with respect to what might seem to be a benefit to the U as against the V. Because I think in that kind of question, you consider not the U as a U but you consider the question of national competition, televisionwise, and if that is the way in which to bring it about, it is television as a whole, and not a particular instrument against another particular instrument.

Senator PASTORE. Has a brief been worked out on this, Mr. Fitzgerald?

Mr. FITZGERALD. Sir, we have not come up with a definite brief. We have attempted various memorandums. I know that you will be perfectly understanding and not critical.

Senator PASTORE. I realize that. I am not trying to press you on this but, as a lawyer, I would be very much interested in reading it. If you get it down to writing, would you send me a copy of it?

Mr. FITZGERALD. I would be pleased to.

Mr. DOERFER. Mr. Chairman, I did not want the committee to think I have a very lengthy statement. I am on page 6 of a 14-page document, so I think I will be able to finish.

Senator PASTORE. Yes. I went through it. I know it is 14 pages.

Mr. DOERFER. This is probably an appropriate time to invite your attention also to the recommendation for an appropriation of $2,250,000 for fiscal year 1961 to make possible an extensive project to determine the effectiveness of UHF television in "canyon cities" such as New York, as well as to gather information of broader application. You will recall that in the report and order terminating its allocation proceeding in June 1956 the Commission noted certain advantages attaching to an all-UHF system, but indicated that further research and development of UHF transmission and reception techniques would be necessary before it could be reasonably determined that an all-UHF system would adequately meet all the needs of a nationwide television service. One of the questions on which additional information is needed on this score is UHF's capacity to render a satisfactory service in the larger cities where line-of-sight reception is impeded at many locations by intervening high buildings. The Commission is, therefore, hopeful that funds will be made available to carry out this project. While TASO has completed useful studies of UHF service under present conditions, it was not possible, within the TASO charter, because of antitrust problems relating to future cost, price, and design to develop basic information respecting improvement in UHF transmission and reception. Nor were there available for study by TASO UHF operations in the larger "canyon cities."

Meanwhile, there remains the question of action which may be open to the Commission in the interim pending further developments on longer range remedies. The practical possibilities for alleviating shortages of television outlets by interim measures are, we find, much more limited than we had hoped when last April I reported to the committee that consideration would be given to immediate steps looking to increased outlets in the major markets now lacking at least three television stations.

The spectrum resources available for interim action are the presently allocated 12 VHF channels and 70 UHF channels. Pending the maturing of a long-range plan, and consistent with the basic goal of a nationwide competitive system, it remains our objective to seek means of improving the competitive situation, where possible, in individual markets. A majority of the Commission believes that this objective should be pursued at this stage by making additional VHF assignments, where possible, in the major markets. However, in the most needful areas the VHF channels which have been assigned or could be assigned under the established standards for minimum cochannel and adjacent channel station separations have been largely taken up. It was for this reason that last April the Commission

embarked upon an effort to ascertain what reasonable use might be made of the VHF frequencies by making channel assignments in the most needful locations at substandard separations where such exceptional action could be justified.

Senator PASTORE. On tht point, you used the words "a majority of the Commission." There, again, without imposing on any secrecy or process of voting, do we stand 5 to 2 on that, or 4 to 3?

Mr. DOERFER. I just do not have the minutes here. I think that was a 4-to-3 vote.

Senator PASTORE. A 4-to-3 vote?

Mr. DOERFER. Yes.

Senator PASTORE. I was afraid of that. [Laughter.]

Go ahead.

Mr. DOERFER. Our proposals have given rise to difficulties and problems on which the Commission and the staff have been actively seeking solutions since last April. They fall into three major categories: allocation principles, technical considerations, and legal and procedural obstacles.

First, as to allocation principles, you will recall in my report submitted last April it was indicated that the Commission felt that the limited number of short-spaced VHF assignments which might be made should be used, primarily, to remedy critical shortages of facilities in important population centers. Stated otherwise, this means adding VHF channel assignments in the larger markets which have fewer than three VHF stations and little or no UHF receiver conversion. While this interim objective has received support from those primarily interested in the construction of additional stations in the larger markets, it has been subjected to criticism by others who urge that first consideration should be given to smaller markets which now lack any VHF station outlets and either have no locally originated television service, or which are served only by a UHF station.

Mr. Cox. That would be Akron?

Mr. DOERFER. That would be what I would say.

Senator PASTORE. That could be Akron.

Mr. DOERFER. Because the question continually recurs, I would like to restate for your committee the basic considerations here involved. The objectives of the table of television assignments embrace both goals of a local outlet in as many communities as possible and multiple outlets in as many markets as possible. Working, as the Commission did in 1952, on the assumption that 82 channels could effectively be made available for a nationwide television service, the specific city assignments provided channels with close regard for both objectives. Desirable as these objectives continue to be, the immediately available spectrum resources suitable for use in an interim program are far more severely limited. Operating, as we are at this point, on the premise that effective interim improvement can be made available only through short-space VHF assignments, and recognizing the severe limitations on the practical use of such assignments, which will be illustrated later, we simply must face the fact that choices—hard choices—have to be made. Without in the slightest degree derogating from the importance of first local outlets in some smaller cities, it has seemed to the Commission that where a choice has to be made, it will be

preferable to use the available channels where they could benefit the largest number of people by providing a third (in some cases a second) VHF service in one of the major markets now lacking it.

Senator PASTORE. Before you go further here, are you unanimous on this? How do you stand on this? Is it 4 to 3?

Mr. DOERFER. I hesitate to say so, without asking the members.

Senator PASTORE. I do not ask for the specific vote, but are you reaching more unanimity on a definitive solution. This is cutting down your separation—what you are talking about here.

Mr. DOERFER. Yes. Well, I think perhaps you had better ask the——

Senator PASTORE. I do not want to take a poll, but here again, it is still within that area of four to three or five to two?

Mr. DOERFER. Yes.

Senator PASTORE. You see, that is what disturbs me to know, and I do not say this with any criticism at all, but that is just the point. On all these very sensitive areas you are so close on your vote, and the body, on one side or the other, is so in conflict that I question the efficacy of ever getting anything done.

Mr. DOERFER. No, Senator, to me it indicates again—I have worked and lived with these men. They are intelligent and conscientious and it just indicates a terrifically difficult problem.

Senator PASTORE. I do not impugn the sincerity of anyone or your dedication to public service. Please do not misunderstand. You are honorable people, just as honorable as anyone on this side of the table; but what is frustrating about this is we just do not seem to get anywhere, and I think that all this points to the futility. Now there we have Bob Lee making motions with his right hand and he is not agreeing with almost anything you said. Where are we going? Are we going to allow this thing to deteriorate the way it has for the last 6 years, or is there a solution? You have got to realize this. Even your five suggestions are rather farfetched under the realistic practical situation as it exists. The first three entail getting channels from the military and then you get to the last one, which I think is Bob Lee's idea, and then this is tied up with a law, getting a law, which is constitutional. Ken Cox tells me he thinks it is constitutional. I have my doubts whether or not it is a proper exercise of the police power. But again I do not see any greater hope in the nine pages you have read now, than I saw 5 or 6 years ago. I am not saying it is your fault; I am not saying that at all. But I do not see any hope at all for these poor UHF operators who are here today listening. My heart goes out to them.

All right. You may continue.

Mr. DOERFER. Another aspect of short-spaced channel assignments of which your committee should be aware is that they do not provide something for nothing. There is a price tag attached.

May I say something? This last statement I have got to make. I can say, and I think I can successfully defend it, that these seven Commissioners here today know more about this problem than any single individual or organization in the United States.

Senator PASTORE. I realize that. But do these same Commissioners have a solution for the problem?

Mr. DOERFER. It just merely indicates the solution is most difficult, as are many other problems. I could not change this country back into using the metric system or change the calendar, although probably we would all agree it is a much more efficient and more accurate method.

Senator PASTORE. Is it your present attitude, John, as you sit there, that there is a reasonably good setup in television, and that it is it—and we have to live with it?

Mr. DOERFER. No; my whole philosophy about this type of thing is, if I may use a very indelicate expression, you just cannot create a child in 1 month by impregnating nine women. It just takes time. This thing just takes time.

Senator PASTORE. My goodness, if that is a true analogy, we had just better quit right now. [Laughter.]

Mr. DOERFER. The situation is one that, having the experience that I have had, I am most reluctant to concede the field. I am most reluctant to say this objective will not be obtained someday. It is just a question whether or not we are going to rock the boat so badly that we will get such an adverse public reaction that we will probably be thrown back more years if we take this precipitous action suggested.

Senator PASTORE. Would you listen to this, John? This, again, is an off-the-cuff suggestion. I am not an engineer. You are talking about passing a law that will set up certain standards for interstate traffic in sets—your justification for setting up these standards and obliging the manufacturers to comply. The broadcasting industry is a rather lucrative industry. We have heard from a small minority, principally the UHF operators, who are not.

Mr. DOERFER. That is not true. Lucrative——

Senator PASTORE. My experience is, you have a lot of trouble over who will get a license.

Mr. DOERFER. You have that right up to the top. But you have one-third losing money.

Senator PASTORE. Let us put it this way: The broadcasters I know are pretty prosperous. Let us leave it that way.

Would it be possible to require the transmission of this signal by the broadcaster, at the discretion of the Commission, both on UHF and VHF, and at the same time see if we could not work out something with the manufacturers so that they would have the dual set—possibly again resuming these discussions with reference to the elimination of the excise tax on the dual-purpose sets—so that the people who presently have their VHF set could still get this VHF signal if they chose to do it. At the same time, the U signal would be coming over, which the viewer could turn on, one way or the other, as he trades in his set after a certain period of time, or buys a new one, which would be dual set, under the law that Mr. Fitzgerald talked about—could that be a solution? Is that worthy of consideration?

Mr. DOERFER. No. Our problem is this—and I think in your statement you overlooked, or you assumed, one thing. You assumed, by dual operation and by dual receiving sets, the same people that are now getting the service will receive it, and I say no, that is not true; that will not happen.

And I know that the UHF operator or the VHF operator—let me say this: I know that a broadcaster does not want to go out and serve the rural area. He cannot. He is in this thing to make money. He has to make his expenses and he has to make money, or he is not interested in this thing.

Senator PASTORE. No. Let us assume your studies show that technically we would be better off to go on the 70-band system of UHF as Robert Lee has suggested. Let us assume that is the best way. But we run into the practical proposition. What are you going to do about the 53 million sets? You certainly cannot go and tell these people to convert. There would be a clamor to the Congress. You could never pass that legislation. But if you decided you were eventually going to overcome that—not today or tomorrow, but 10 or 15 years from today—and that in order to have a competitive nationwide television system you would have to have it on the U-band because there you have 70 channels—and let us assume you have reached that point—would there be any feasibility, in the renewal of the license of the broadcaster, to say that while we are not taking anything away from you under your present procedure, because you can still send it over VHF, we expect you to install also a UHF system and give the viewer the opportunity, or the alternative, of either receiving it on V or receiving it on U—ultimately after a period of time you would have dual sets throughout the country. Is that a silly suggestion or does it merit some consideration?

Mr. DOERFER. No; that is not silly. The first part of it I would say "Yes," because that is within our legal power. The second would be presumptive on our part.

Senator PASTORE. Is this a new idea? Mr. Cox tells me now it is an old one, and both Mr. Lee and Mr. Craven have suggested it.

Mr. DOERFER. If you are going to do it, you could do it that way; but to tell the people or the broadcasters, that is an assumption we just cannot make.

Senator PASTORE. The people would not suffer from it.

Mr. DOERFER. On the fringes, those would.

Senator PASTORE. No. Later on when they bought a new set it would have to be a dual set, and ultimately the V would go off. But the process would be so gradual and the time involved would be so long that there would not be any inconvenience on anybody's part. This idea of going in tomorrow, into a community like Rhode Island, and telling people they have to convert and spend $50 would never happen. I would be the first one to be against it.

Mr. DOERFER. That is why we suggested the statute.

Senator PASTORE. Mr. Craven, I understand you can enlighten us on this.

Mr. CRAVEN. Well, Mr. Chairman, since you mentioned my name as the proponent of the suggestion you have just made, first, I must say I am not a lawyer. I do not know whether we have the power to require broadcasters to spend this extra money. But assuming that we do have that power, for the moment, and it is a feasible thing to do from the standpoint of the law, I want to call your attention to the fact that he only has one UHF transmitter and one VHF transmitter at the same spot, and the two services will be most unequal. The VHF will go out 80 to 90 miles and the UHF, for similar quality signal,

will go out about 40 miles; so there would be a great many people under that kind of setup who would not get the UHF service. I think something more has to be done. I think you have to have multiple transmission in order to get a similar type of quality coverage over the same area.

Second, in a place like New York City, I have witnessed UHF there. There are many VHF stations there. In New York City if they have a higher power service on the Empire State Building you will not receive a similar quality picture. So you have to require the broadcasters to put in multiple broadcasting in a place like New York City to get similar quality service. That is all I have to say.

Senator PASTORE. In other words, in your judgment it will not work.

Mr. CRAVEN. No; I will not say it will not work. Nothing is impossible in this world.

Senator PASTORE. This is all predicated upon the assumption it was decided by the Commission you would have to go on the UHF band in order to promote this. And that is the reason I keep asking the question——

Mr. CRAVEN. I want to make clear there is a difference in coverage in UHF and VHF. VHF covers more area.

Senator PASTORE. I realize that. We have gone so far, Mr. Craven, that practically everything becomes academic. Even if we had the right answer, it would be only an academic question because you have to face the realities. Even if you decided now we would use the 70 channels on the UHF band, your biggest question is not in reaching a decision but what are you going to do about it, how are you going to get 53 million set owners to agree with you.

Mr. CRAVEN. I would say this: In carrying out your suggestion, or any suggestion made by the Commission, a transition period of several years would have to take place. You would have to have simultaneous broadcasting of UHF and VHF for several years.

Senator PASTORE. That is what I am talking about. It would have to be a long period of time in order to guarantee people would get full use out of any investment they made, only when they replace it with a new set it would be a dual-purpose set that would pick up the new signal, and gradually you would have no inconvenience on the part of the public. I do not say the suggestion would work. I do not know. I am merely throwing it out because, fundamentally, anything decided upon here will have to include the inconvenience to the public. That is the biggest phase of this.

All right, Mr. Lee wants to comment.

Mr. LEE. Mr. Chairman, I just want to make one brief point. I think you made part of it for me when you indicated that the conversion at some point, in order for that to work, must be compulsory. I think if they had the two frequencies and knowing after "X" date, they would not have the two but one, and gradually there would be a diminution of the number of hours they were on the air on the air on the "V," so tht the people would know.

I have suggested something in the neighborhood of a 5-year period, feeling that this is about the period of attrition of a large number of sets.

Senator PASTORE. You could even make it longer. You could make it 10.

Mr. LEE. It could even be 10. On the matter of the disparity of the "U" and the "V," I think it is only honest to admit, under existing conditions, that there is a disparity. I think the degree of disparity has been overemphasized by reason of the fact that the comparisons which have been made on existing operations are comparisons with the "V" on a high tower or higher power, with a "V," than with a "U" which is really struggling along and has not put the effort and investment into it because he just cannot afford it. The average UHF installation has an average height above average terrain scarcely more than half of that of VHF. For VHF it is 1,034 feet, and the average "U" is only 640 feet. So I think this conclusion, on the basis of the large disparity, has been based upon examinations of, one, having the maximum of everything, and two, on the other side, being the fellow just struggling along without the money to invest.

Senator PASTORE. All right, Mr. Doerfer.

Mr. DOERFER. With respect to the person with a receiving set, you have to take this in consideration. We, or Congress, may propose dual sets, but he does not have to buy. And as long as he is getting a "V" service and manufacturers are making "V" sets, and you cannot stop them, he will buy it, because it will be cheaper.

Senator PASTORE. I realize that.

Mr. DOERFER. So you can do all the proposing in the world here, Mr. Chairman, and we know people will walk miles to save a dollar and will do the same thing with respect to receiving sets as with an article of clothing or food.

Senator PASTORE. I realize that. But after all if for the public convenience and necessity it becomes necessary to change from, say, 12 channels to, say, 70 channels and the only way you can do it is by going from "V" to "U," and if that is going to be ultimately the decision and the public is given a reasonable opportunity to make the conversion, that is, if they will actually run down their present investment and when they go to replace it they buy the new one in order to take advantage of this competitive system which is in everybody's interest—you could only sell it on that score.

I realize that it is a tremendous problem, but the one thing I mean to say here is that we are merely drifting. Frankly speaking, I do not see anything practical culminating from the first suggestion you have made for years.

Mr. DOERFER. I do not agree.

Senator PASTORE. First there is the reluctance of the military to give up anything they have, and who is going to dispute them? The minute they stand up and say it is for the security of the Nation in this troubled world, we are not going to be troubled about the convenience of people who want to see a little better picture. Their safety and security is of primary importance, unless someone is strong enough and courageous enough to say "You are all wrong about this; this is what you have to do." Your first three plans are predicated upon that, and your last plan is predicated upon going right over to the "U," more or less, with the utilization of the 12 existing channels.

Well, all that adds up to a certain amount of uncertainty, about which I am not too sure.

Mr. DOERFER. Senator, I think you put your finger right on it. It is a question of whether somebody is strong enough and courageous

enough to say to the American people "You have got to do this." I am not. I just cannot, without a good reason, tell the people they have to do something.

Senator PASTORE. Well, John, will you say this then. Will you say that, as you look at this picture for the next immediate few years—and I am speaking now in terms of 3, 4, or 5 years—that conditions are going to stay pretty much the way they are?

Mr. DOERFER. I think so. I think those are the facts of life. I do think, however, if I may take just a slight exception to your characterizing this as drifting: I would much rather say that we are probing; and I would say this: That I agree that you have the same concern that we do, and that is how can we ease the public into high gear, or high UHF, with the least amount of dislocation and the least amount of expense to them.

Senator PASTORE. That is not your immediate question. You begged off on that. You are not prepared to go to "U," anyway, so there is no need to talk about conversion.

Mr. DOERFER. I would not hesitate a moment if I though we could make this transition without the serious dislocations I have suggested and the extra expense, as against the possibility of getting some of this from the Government.

If we cannot get it from the Government, then I see no other solution except a Government mandate, either by an agency so oriented or by Congress. And I have said this and I do not mean it facetiously: Any Congressman that ever votes, in the event the Commission is recalcitrant, for that type of proposition will come back to Washington only as a tourist. I am satisfied with that.

Senator PASTORE. Let us suppose we cannot get the military to agree, where else is the solution? Where else can we look?

Mr. DOERFER. I think the only solution we can possibly make, then, is after we get more reliable—or for lack of a better term, different—information than we have today, from the engineers, with respect to the propagation characteristics of UHF, we cannot do anything.

May I suggest this? Commissioner Craven has indicated that perhaps multicasting in such places as New York would be acceptable to the people of New York; but multicasting may take, as I understand it, four to six UHF channels. What have you gained? The ratio today is 12 "V's" to 72 "U's," and if you are going to take, say, 6 channels to replace on "V," you have still got a shortage, at least in the New York area.

Senator PASTORE. Will your report indicate this?

Mr. DOERFER. No, I do not think so.

Senator PASTORE. Incidentally, let me ask you this question. You are familiar with the Bowles report?

Mr. DOERFER. Well, I cannot say thruthfully that I am.

Senator PASTORE. Let me put it this way. He suggested, if I remember correctly, though it is some time back since I read it, that we appropriate, as a starter, some half a million dollars to get some technical institution like MIT or some other agency to make a survey and to come up with a solution as to the problem on the promotion, technicallywise, of a nationwide television system. Do you think that needs to be done?

Mr. DOERFER. Oh, it needs to be done, but I do not agree with Professor Bowles, the way he suggested it be done. My experience so far governs with respect to these so-called independent committees, outside of the fold of either the FCC or the industry—you just spend a half a million dollars to educate them. They are the ones that get the education and they come out of the same door they went in.

Senator PASTORE. Is your Commission equipped to do this job, then?

Mr. DOERFER. I think we have the nucleus, and I think we could probably—we have a terrific job competing with industry. We could probably get some additional talent, engineeringwise.

Senator PASTORE. Do you think the job needs to be done?

Mr. DOERFER. Commissioner Lee just reminded me, and I am sorry if I did not make it clear, that that is what the $2,250,000 is for.

Senator PASTORE. The what?

Mr. DOERFER. The $2¼ million is for that I just mentioned. We have requested that from the Bureau of the Budget.

Senator PASTORE. You are agreeing, in other words, with the Bowles report insofar as a study has to be made?

Mr. DOERFER. Yes, but I would not want somebody outside of the industry and somebody outside of the Commission to make this.

Senator PASTORE. When you have got your $2¼ million, what would you use it for?

Mr. DOERFER. I think we would go into the New York area, and we would first of all check the adequacy of the transmitter equipment. As Commissioner Lee points out, in his opinion some of the shortcomings has been the inadequacy of the transmitting equipment. I doubt very much if CBS or NBC or Storer would operate that way. They do not operate that way. They would get out the best. He does indicate we would probably have to get out a different receiver, a receiver which is much more efficient than today.

Now, if we could get, say, 200 receivers with the parametric amplifiers and we could find that the ultrahigh could do substantially the same job as the VHF in distance and penetration, you would remove, in my mind, one of the greatest obstacles you have today.

Senator HARTKE. Will the Senator yield?

Senator PASTORE. Yes.

Senator HARTKE. Let me ask, is it your opinion that the fact that you have a seven-member Commission here, dealing with a very complex problem and with varying views, makes it virtually impossible for you to come up with a strong decision, which is necessary, or which Senator Pastore suggests would probably be necessary, in the public interest?

Mr. DOERFER. No; I could not subscribe to that, Senator Hartke. I think it is a godsend that you have seven people who have devoted as much time as they have to this problem. I have been prevented from precipitous action by heeding the advice of some of the other members.

This problem is a large problem. It does not lend itself to an easy solution. It takes a lot of minds. It takes a lot of thinking.

Senator HARTKE. I understand that, but from the fact that you have difficulty arriving at a decision—and I know the Chairman was attempting to find out what this decision was a few moments ago, what the vote was and how many of the Commission members agreed

with you—would it not be better to establish a new Commission or have an administrator with final authority? Would this type of administration effect a better solution to this complex problem and then let this authority, in turn, rely upon this advice, and other elements, and then come to a final decision which would be able to be effected?

Mr. DOERFER. No; I do not think so. I think these Commissioners know as much about it as anybody in the country.

Senator HARTKE. But you are in the spot where you have almost come to where we have to accept the status quo, and the rest of it, as Senator Pastore has suggested, is almost academic.

Mr. DOERFER. Well, the problem is complicated because it involves not only engineering and the everyday changes in the technical art, but we have the psychological problem on the part of the public. We have the economics of the situation. I would say this: I have a high regard for many of the engineers who appear before the FCC, but really, with all due deference to them, I have not found one whom I would regard as an allocations engineer, and I am talking about the nationwide situation. This is almost an uncharted sea.

Senator HARTKE. But the problem of reaching a final decision is complicated by the fact of the varying opinions of the members of the Commission.

Mr. DOERFER. Yes. As I indicated to the Commission, I have great concern how we can shift from whatever situation we have today to another without causing real hardship to people in the rural or fringe areas. I have talked to UHF operators, and when I say to them, "All right, how are you going to take care of these 5,000 people out here in the sticks," so to speak, they say, "Well, maybe we will put up a translator," and by the time you get through with it, they use up more UHF channels to do the job than if you had one single VHF.

Senator HARTKE. Would the result of all of these complicating factors be such that the only decision which you would really reach in the Commission would be a decision to reach no decision at all?

Mr. DOERFER. I do not think so. But there are many complicating factors. We must remember that the military use for many of these channels is worldwide. We have to negotiate for them, and they have to not only operate airplanes in this country, but have also frequencies which will allow them to operate their airplanes all around the world. Then we have the international situation. The radio spectrum does not belong to the United States of America. We have to deal with all the rest of the countries.

Senator HARTKE. Ultimately you or someone has to decide; and even if you have to decide not to decide, that is a decision, though not necessarily the most desirable one.

And I think that even on these matters of national defense, somebody has to make a decision, and this is a real problem of our modern society—the ability and the knowledge necessary to make a courageous decision.

Mr. DOERFER. I would say this: That if this Commission today were sure that all of the frequencies that are under the jurisdiction of the Government, as distinguished from the non-Government, had characteristics or international complications so it could not really, apart

from the cost, transfer any of that to the non-Government, I do think that we would have made a substantial step toward some solution, though it may be a painful one.

You would not have me, for illustration, being as reluctant as I am to forego the possibility of getting some of the VHF spectrum from the Government. I would then very seriously look at a rearrangement.

First I would try the combination of the V's and the U's, almost on a wide-area basis. I know the economics of the situation require that in the sparsely settled areas, you have got to have broadcasting facilities which can cover a lot of territory in order to sustain itself, and certainly, if you want a competitive system, to sustain three—at least three.

Senator PASTORE. Will the Senator yield at this point?

Senator HARTKE. Yes.

Senator PASTORE. May I ask you this question: What is your opinion with reference to how we should go about speaking to the powers that be that have control over the governmental use of some of these channels—leave it to you to negotiate?

Mr. DOERFER. Well, I think Commissioner Ford will be in a position to comment. Did you want to hear from Commissioner Ford?

Senator PASTORE. Yes.

Mr. FORD. I have a prepared statement, which is fairly short, and I think perhaps I can present it to you quicker through that prepared statement than in any other way, if it meets with your approval.

Senator PASTORE. I asked a very simple question, Mr. Ford. I do not mind listening to the statement, but what I am trying to resolve in my own mind and crystalize is this. We did attempt, in the Senate, to go about this by having this Commission appointed to get about this job. I know you have been in conversations with some of the representatives of these departments. Do you think we should leave it to the Commission to negotiate this, or do you suggest it should be gone about in some other way?

Mr. FORD. Well, the Commission began last April having meetings between the representatives of the Department of Defense and OCDM and representatives of the Commission. We had a total, I think, of about 26 meetings, and that would be on the average of less than every 2 weeks. In the meantime considerable work was done by all members of this ad hoc group. We have laid on the military data and all of their requirements in this area, and the Commission, having completed the evidence in it, was also in a position to estimate the needs and project in the future the needs of the civilian population; and the work of this group—and it does not make any difference who does it. This is the group that is knowledgeable in this area. A commission appointed by the Congress or a commission appointed by somebody else can go into it. But this group of men doing the work, the technicians, are the people who are knowledgeable in this field and the ones anybody has to rely on. That is the source of this information and the factual information we have now obtained.

No recommendations were made by this particular technical group and the next step, as a matter of fact, we made yesterday and was for plans for a meeting next week to try to come to some conclusion whether or not it is possible to obtain channels from the military, or

not to obtain them; and if that one solution of the alternatives is eliminated, then it will be eliminated permanently because the military has been very cooperative with us in attending these meetings and doing this engineering work.

Senator PASTORE. Well, so has Khrushchev been very cooperative in attending meetings, but he never agrees to anything. [Laughter.] How do the prospects look for a solution at the moment?

Mr. FORD. I would say the prospects at the moment do not look too favorable.

Senator PASTORE. Not too favorable?

Mr. FORD. That is right.

Senator PASTORE. Without being too impertinent to anyone, do you think this is a place where the President, or someone under him, should step in and say "The FCC has made a good case here. It is my decision and I think you boys ought to go along and agree to something here."

Mr. FORD. This is the report of the technical group. Commissioner Craven and I met with the policy people yesterday from OCDM and hope to arrange meetings with people at a higher level so we can get their determination what the effects of the facts that have been disclosed by this technical group are.

Senator PASTORE. And how long, Mr. Ford, before we get a definitive answer—before we can move into another alternative, if we have to?

Mr. FORD. I have been overly optimistic, ever since I started this project, as to time. We have pushed it just as hard as we can push it.

Senator PASTORE. I realize that, Mr. Ford.

Mr. FORD. For me to say one meeting would be sufficient would be guesswork—or two meetings or three meetings. I think, after we have had our first meeting, we would be able to survey the possibilities of how it is going to go. We have not had that yet.

Senator PASTORE. Well, will we know by April 1?

Mr. FORD. I can tell you this. We will do our best to know by April 1, or earlier than that. But I cannot tell you definitely.

Senator PASTORE. Would you please apprize this committee by April 1 exactly where it stands?

Mr. FORD. The status of the negotiations?

Senator PASTORE. Yes.

Mr. FORD. Yes, sir.

Senator HARTKE. May I ask a question?

Senator PASTORE. It is your floor.

Senator HARTKE. Does your Commission have the power to do what Mr. Pastore asks? As I understand from his question, he wants to know if you have the power to do what you suggest to accomplish what you are after here.

Mr. FORD. At the present moment the President has the authority to allocate the spectrum, and so does the Commission. And the allocation between Government and non-Government uses have been negotiated between the Government and the Commission since this allocation began.

Senator HARTKE. As I understand it, you have given a target date to Senator Pastore, in which you are going to tell the committee——

Mr. FORD. What the status is as of that date.

Senator PASTORE. That is all Mr. Ford can do. I realize that. You cannot tell the President what he must do. It is his decision. I suppose he would be pretty much guided by the OCDM.

Mr. FORD. It seems to me, Mr. Chairman, in the statement filed by the Commission in April, and in the statement today, they have pointed out very definitely the method by which they are undertaking to arrive at a solution of this very difficult problem. We outlined the alternatives. First, was it actually possible to get additional VHF channels—and if we do, of course, we have still the intermixture problem as we have it now. Any change in the allocations would result in intermixtures of some kind and, in any case, we are going to have to get the help of the Congress before we can get off the dilemma we are on right now.

Senator PASTORE. We have know this for 6 years.

Mr. FORD. Last April we suggested this statute and we come again today requesting consideration of it.

Senator PASTORE. Do you mean the statute with relation to this stanrdard?

Mr. FORD. That is right, sir.

Senator PASTORE. Well, are we not getting the cart before the horse? What good is it, unless you get this agreement from the military?

Mr. FORD. If the Congress determines that either the 12 channels or the 82 channels presently assigned is going to be satisfactory, then we do not need the statute. But in any case, if we go to UHF, the gradual transition that you suggested, the statute is designed to accomplish because if, beginning next year or the year after, every set that came off the production lines was in all-channel receiver, in the course of 7 or 8 years the entire country would be equipped, because the existing receivers would become wornout and antiquated and so on.

Senator PASTORE. Suppose, after everybody has gone to the expense of converting, that you decided not to use the 70 channels? Suppose you do not desire to go to UHF and intermix, where are we?

Mr. FORD. We still have the 70 channels.

Senator PASTORE. But if you do not have an operating station on the channel, what good will it do? Do you mean you are going to compel those operating V's to go to U's? You see, what I do not understand here is this. What you are saying here is that you want Congress to enact a law making it mandatory for the manufacturer, if he sells his set in interstate commerce, that it should be a dual purpose set. Is that what you say?

Mr. FORD. To receive the channels allocated to television? That is right.

Senator PASTORE. We go ahead and pass this law and people buy these dual sets. But if you do not go to dual sets, where are you?

Mr. FORD. But the way the statute is drafted, it does require the standards to encompass your UHF? If the military is able to give us suffcient channels in VHF——

Senator PASTORE. And what if they do not and we pass the law now——

Mr. FORD. But the law would not require either the extended VHF. or extended UHF. It would require the receivers to receive the portion of the spectrum allocated to television—which is finally allocated there—and not some speculative matter, so the public would waste its money to buy the sets.

Mr. Cox. So you could not proceed unless the Commission had decided whether the sets were for 50 channel V, or 82 channels, or 70 channels?

Mr. FORD. Yes; and I am convinced it is impossible for the Commission, unilaterally, regardless of the Congress, to establish a 70-channel set as the final one, or 82 channels, or take any other action in this field, because it is a major policy decision of the Government and it seems to me that the support of the Congress is necessary for an ultimate decision in this area.

Senator THURMOND. The statute proposed by you is a permissive one, not a mandatory one?

Mr. FORD. That is correct, sir.

Senator HARTKE. Let me ask you, why do you need it now? How does it help you now? What I do not understand: You are making a decision that you need a statute to do something in the event you make a certain decision at a later time, or a recommendation at a later time?

Mr. FORD. That is correct. Because it is impossible for us——

Senator HARTKE. Is there any thought on your mind that if you come up here with a recommendation which really is basically sound and is in the public interest that the Congress would not provide the legislation to implement your position?

Mr. FORD. I assume they would.

Senator HARTKE. Well, this assumes they will not and that you are saying to Congress, first, as I understand it, "We do not think you will go along with our recommendation after we make it. We want you to give us the authority to do it first, and then we will come in with the recommendation."

Mr. FORD. I am not urging the Congress to take immediate action. I would like to have this considered. It takes times to pass a statute of this character. You would want to listen to manufacturers, you would want to listen to questions of cost, and the legal questions raised, and so on.

But the point is, unless there is some way that all-channel receivers—we had it in color television when the Commission adopted a color television system, the manufacturers did not make it.

Suppose we adopted Commissioner Lee's point of view, everything is UHF. Then what happens if we say "On January 1, 1965, everything is going to be UHF"; and the manufacturer says "So what, you make the sets." The Commission cannot make the sets, and you come to January 1, 1965, and the public does not have UHF sets in its hands; what good is the Commission's decision then? We know we cannot take the station off the air and compel them to convert.

Senator PASTORE. Do I understand your correctly that it is at least your personal point of view something has to be done?

Mr. FORD. That is correct; and I think we have established a method whereby we can arrive at a final conclusion on this thing. The first step on that method is to determine whether or not we can get extended V's; and if that develops to be impossible, then you have the last two alternatives: The all-UHF, or the UHF and VHF, as we have right now.

Senator PASTORE. I do not want to be impertinent, but how many of the Commission agree on this? Is that an unfair question? Do you all agree on this, that you are trying to work out this thing with

the military, if you possibly can do it, and if you cannot accomplish it there, you will go elsewhere?

Mr. FORD. We have two alternatives.

Senator PASTORE. That is what I am trying to get you to say.

Mr. FORD. I may be right in Commissioner Lee's corner; but he cannot get to where he is going, and I think it is premature at this moment, because we are not in possession of all of the facts and we are well on the way. All of the figuring has been done.

Senator PASTORE. How about all this investigation, this study that has to be made; is that included?

Mr. FORD. The study itself, the technical work of the Commission is completed.

Senator PASTORE. It has been.

Mr. FORD. The study work has been done. It is a problem of making the determination between the military and the Commission.

Mr. COX. And the alternatives, if you do not get them, are what?

Mr. FORD. If the results of that are that it is impossible, we have two alternatives left—and that is why I say we need the help of the Congress. We cannot just solve this problem alone because of the receiver problem.

Mr. COX. You would need that help for anyone of these five alternatives?

Mr. FORD. Yes.

Mr. COX. With the possible exception that Commissioner Lee feels it would not be necessary for an all-UHF.

Mr. FORD. I do not know how he could work it out unless he does have this authority.

Senator PASTORE. Even so, Mr. Ford, your plan does entail a slight conversion on the part of people who already have sets?

Mr. FORD. That is right. But it is not an immediate conversion and does not completely destroy the value of the sets they have in their home.

Senator PASTORE. And you believe if it were stretched out over a period of time, that would diminish the problem.

Mr. FORD. That is correct.

Senator PASTORE. Let me ask you this question again. Do you not think that if we have the Congress pass again this law that we passed—when was it, last year—setting up this independent agency to prevail upon the President, as an impartial body, that some of these channels ought to be given up—don't you see what you are doing? You have got more or less what is being done on the Commission level with the people who formulate policy in the military. The fact of the matter is, you are still on the staff level, so to speak, because the ultimate decider will have to be the President of the United States; and he has got to decide whether to listen to, let us say, Mr. Ford or to General Twining—and I can imagine who would decide that question. [Laughter.]

Mr. FORD. Thank you.

Senator PASTORE. What we need is some agency impartial to both of these questions, and it can say "Mr. Ford makes a lot of logic and, Mr. President I think you ought to do thus and so." Don't you think with a high caliber impartial body you would get there quicker?

Mr. FORD. I do not think on this matter I would like to speculate, because, after all——

Senator PASTORE. You do not have to answer the question. I answered it anyway. That was our point. We felt if this thing were left at your level, and you have already said at this time you do not think the prospects are too favorable. I think you will need someone in there of an impartial character who will listen to you and the other side and say, "What do you need it for" and people who can get classified information. That is all Mr. Bowles was talking about.

Mr. FORD. We have been into that very thoroughly.

Senator PASTORE. You have been into that?

Mr. FORD. Yes, sir.

Senator PASTORE. I hope by April 1 we will get a more definite answer.

Mr. FORD. I will report the status on that date, but I certainly hope you will not expect me to solve this entire problem by that time.

Senator PASTORE. I will not. Would you still suggest we consider this legislation you have spoken of before April 1, or should we wait until April 1?

Mr. FORD. I would think the machinery on this legislation should begin, because it does not make any difference which way this thing goes, we are not going to be able to make any transition from the present 82 channels——

Senator PASTORE. Unless something——

Mr. FORD. And another thought: Suppose, Mr. Chairman, you want to stay with the 82 channels? If the public can receive the signals of those 70 UHF channels, if that is the final ultimate decision, then somebody will build those stations and the local areas will receive service.

Senator PASTORE. Has this legislation been drafted?

Mr. FORD. Yes, sir; it was completed yesterday.

Senator HARTKE. Would the chairman yield for a moment?

Does Commissioner Lee agree with the statement made by Commissioner Ford that this legislation will be necessary for the final alternative?

Mr. LEE. I think this legislation would be helpful, Senator Hartke, as an inducement to speeding up conversion. I do not think it is necessary; I think it is helpful. I think if the decision was made to go to UHF, the manufacturer would be looking at a very sweet market and would probably be interested in doing it. As a further compulsion, I would favor this particular legislation.

Senator HARTKE. I am not in favor of passing laws which are not necessary.

Mr. LEE. Well, I say it is not necessary for the all-UHF system. On the other alternative, I do not know. But you have made a major contribution here if seven of us have agreed that if one, two, and three cannot be reached, we will go to four and five.

Senator HARTKE. All I wanted to point out, Mr. Chairman, is what is the use of going through hearings on legislation which may not be necessary?

Senator PASTORE. Well, results are not guaranteed; but if you are going to get into any system at all of borrowing channels now in governmental use, or full utilization of all of the 70 UHF channels, then

you have to have some legislation that covers that question of conversion—not immediate conversion, but something setting up standards which in time will minimize inconvenience on the part of the buying public, and merely by the process of time you will get to the point where you will standardize a dual purpose set.

Mr. FORD. The only time you would not need that is if you get to the point where you decide you need a 12-channel system.

Senator PASTORE. How many feel we ought to recommend this now, that legislation?

Mr. DOERFER. I think so, it is permissive. If these things unfold and develop and lead us down the last two alternatives, we have got something. Actually, if this is adopted and becomes a law, even if it is never implemented, there is no harm done.

Senator PASTORE. All right. We will have our staff draw it up in legislative form and we will introduce it by request.

Mr. FORD. We have a draft we would be happy to submit.

Senator PASTORE. And we will hear what other people have to say about this.

Mr. CROSS. There is one thing about an all-UHF system that causes me a great deal of concern. As Commissioner Craven told you, at the present time, as far as technical knowledge is concerned, the V covers a much wider area than the U. The only way you could get from the present system to an all-U, in my opinion, is by the suggestion you made: That is, that you make the V operate both V and U, and at some time in the foreseeable future, you shut off the V.

However, I come from a small place, and we get our signals from a long way off; and unless we could get U's in that area, then when you shut off the V, our people would be left without any signal at all. And on the basis of a 70-mile V and a 40-mile U, simple arithmetic on the power of squares means when you shrink from V to U, you lose about 10,000 square miles for each one. That is an awful lot and that is the thing that causes me the greatest concern. Thank you.

Senator PASTORE. And where would you expect most of your objections to come from, the operators of the stations?

Mr. CROSS. You would get objections from the operators of the stations, but with all due respect to the operators of the stations, that would not cut near as much ice with me, as it would from the people from the rural communities in a fringe area who would get no service.

Senator PASTORE. Could you not drop in more U's in those parts?

Mr. CROSS. If you could get the economics to support it; but that is one of the major situations. You can make a crisscross, and in fact that has been done throughout the country on a grid pattern, but the fact is where some of these lines cross is where no one in his right mind would put up a station.

Senator PASTORE. Would you not say most of the trouble would be in the congested areas?

Mr. CROSS. No, from the people out in the country.

Senator PASTORE. They are using boosters, right now, are they not?

Mr. CROSS. No, there are some boosters that are in use that have been brought about that way, but in my part of the country we have no boosters in use.

Senator PASTORE. Will this be included in the study you are conducting, or will we have answers to this?

Mr. CROSS. With the military, do you mean?

Senator PASTORE. No, I mean with respect to this differential between the 40 and 80 mile coverage?

Mr. CROSS. No, sir. That would have to be taken into consideration. At least as far as I am concerned, it will.

Senator PASTORE. The point is this: You can give me a thousand different reasons for all the problems involved but somewhere along the line you have to make a decision. If the problem outweighs the solution which is being talked about here, it will have to be so stated; but all I am saying is that somewhere along the line someone will have to stand up and say, "This is what we propose to do." The first thing you have said is "We will talk it over with the military and see if we can not borrow some of those channels from them; and if we cannot, we will have to do thus and so—if we cannot do that, we have to go to this other alternative."

And if we cannot go to all the other alternatives, for the reasons stated, then you have to stand up and say "We cannot do anything about it."

Mr. CROSS. That is right.

Senator PASTORE. All we want is an answer. Somewhere along the line the American public will have to be told this thing can be done or it cannot be done. We have been wrestling with this for the last 6 years.

Mr. DOERFER. We did say that last April.

Senator PASTORE. Let me interject this. Why were we not asked about this $2¼ million study 6 years ago?

Mr. DOERFER. I can probably answer that, but first I would like to answer the first question. What we said here today we said last April.

Senator PASTORE. But not 6 years ago.

Mr. DOERFER. I can understand that. I think the 2¼ million is the result of some differences of opinion on the efficacy of the TASO report. There are some engineers and people who think that UHF, if given the proper equipment, will perform almost substantially as well as VHF.

Mr. COX. Is that study to be financed by this $2¼ million to be done by an outside agency or by the Commission itself?

Mr. DOERFER. No, I did not understand that. I stand corrected on that. That is right. We did recommend a contract.

What I had in mind was that we get—although they are independent, knowledgeable people, I don't want to spend the Government's money to keep on educating people, and then have them finally come around to the same viewpoint we have.

Mr. COX. Would this study, financed in this way, be limited to intensive development of UHF equipment or the determination of the potentialities of UHF equipment?

Mr. DOERFER. I think it would take into account equipment which is off the drawing board, which is a recent development and did not exist 6 years ago—take it out in the field and test it and see whether or not it has the propagation characteristics, and whether or not the receiver can get it as it gets the VHF.

Mr. Cox. These are parametric amplifiers and other things you discussed?

Mr. DOERFER. Yes.

Mr. Cox. In other words, this is not going to be a complete overall audit, such as Dr. Bowles proposed? This is to be a more specialized intensive effort?

Mr. DOERFER. No, I think what we had in mind was to go in the city of New York, because the chances are if it works there it will work in any large metropolitan area.

Mr. Cox. Is it conceived that this will ever demonstrate that UHF can match the propagation characteristics of VHF?

Mr. DOERFER. The only person I know who has conceived that is Commissioner Lee.

Mr. Cox. In other words, was it not inherent in the Commission's report and order of June 26, 1956—in which it said the only proposal then made which was worth further discussion was this shift all to UHF—was it not recognized in that report that even with the hoped-for improvements in UHF equipment, there would not be an equivalent coverage, and that therefore, for some time, the Commission was going to have to take the gamble—when you shut down the V and therefore cut off some service, to whatever degree the U has been unable to equal the V—you have to take the gamble that some new station will have to come into existence, or some auxiliary means will have to be found to provide service to the people in that area?

Mr. DOERFER. I think in that field we are the experts. I doubt very much unless you give us the power to compel the UHF operator to take care of fringe service he will do it.

May I give you an illustration? It is my own, and it may be very faulty. But if you took a triangle with, say, 12-inch sides and put it on the table here and filled the area within with half-dollars, you would cover a substantial amount. If you take those out and cover them with dimes, you don't get more area. You are liable to get more space in between. The cutting down of these little surfaces when two circles meet each other, those gaps in between is the problem that bothers me.

Today, in much of the territory, as I indicated before, 98 percent of the people get at least one service. You would certainly not recommend, or be held responsible for, an all-UHF system which came up with substantially less service and cut it down from 98 to, say, 90 percent of the people.

Mr. Cox. All right. Suppose you get done with this test in New York and you find the differential in range between U and V is reduced from a differential of 2 to 1 to maybe 10 to 8 or 10 to 7. Would the Commission then be in a position to apply this regionally, say, in the northeastern part of the United States, where the greatest problem seems to have developed, and reach a decision whether it is worth taking a chance that the lattice that Commissioner Cross talks about would fall in communities of such size that there would develop UHF stations in a lot of communities in Ohio, and Pennsylvania, and New York, and Massachusetts, which do not now have stations but which are of reasonable size, and that in this way, although no station had the coverage of the stations that exist now, you would

come close enough to providing an equivalent service that this would be a feasible step?

Mr. DOERFER. I do not think, Mr. Cox, that I could answer that at this time. That would require some experimental work, either on paper—we would have to move these coins around, as I see it, to determine whether we would have to use both.

The difficulty is that the symmetry—the dream of an engineer on a television allocation map just does not line up with the communities. People do not congregate in perfect symmetry. That is just part of our problem.

I would like to make this observation. As long as this Commission and this committee are anxious that people get multiple services, I do not think that the situation today is really very alarming. When you stop to consider all communication services as far as local expression is concerned, we have more than there are daily newspapers—we have more television stations in the metropolitan areas than there are daily newspapers.

So really, if you observe the habits of the people, what are they interested in? They will get their local news. They would like to get it on their local television station, no doubt, but they get it through the TV station and the local radio station and newspapers; and when they turn on the television, what do they want to see? High budget television programing. Those are the facts of life. A local station just cannot budget that type of money which will attract and hold these local groups. It is a dream but wholly detached from reality in 1960. It may come around in 1970. I don't know.

Mr. Cox. Why does the Commission keep saying 12 VHF channels are not enough? Why does it keep trying to achieve allocations aims or goals which were set in 1952, which say there ought to be something more than simply 97 percent coverage with network programs originating from New York and Hollywood?

Mr. DOERFER. I suppose those statements have been made over the years because it pains the Commissioners to see they have 82 channels and only 12 of them are doing the work.

Mr. Cox. Are you saying they are doing enough of what the Commission wants done, and that it is not too bad if you do not get beyond that?

Mr. DOERFER. No, I don't think it is doing enough, but I don't think it is as alarming as some people conscientiously fear. People are not alarmed about it. We should be leaders and try to help people even though they don't complain. But I do not believe the situation is so bad that we should gamble $2\frac{1}{2}$ billion of the people's money. It is for them to decide.

It is just like any other thing that is highly desirable. I suppose there is not anybody in this country who would not like to have his child or his children go through college but the facts of life are just that everybody cannot do it.

Mr. Cox. But this expenditure of $2\frac{1}{2}$ billion would simply be an increased cost in the replacements of sets over 10 years because the public was required to buy an all-channel set rather than a VHF only set.

Mr. DOERFER. If you are going to have duplicate services so that people can receive both V and U, and you think that is the less painful way to ease them from one service into the other, then certainly the $2 billion plus I am talking about is in addition. You just can't make an all-channel set for the same price you can make a V, today.

Mr. COX. But it is not an expenditure to convert an existing set. It is added cost when they next replace their set.

Mr. DOERFER. Yes. Well, it will depend how you go about it.

Senator PASTORE. Mr. Doerfer, tell us something about this new separations plan.

Mr. DOERFER. Well, we know that there are some communities that do not have adequate competitive facilities from a network viewpoint. I do not think there is any Commissioner really concerned with solving the problems of a third network per se. They are interested in what that third network offers the people.

We in Washington enjoy it. I would like to see the people in Grand Rapids, in Louisville, in Syracuse, and in Rochester, N.Y., and in Providence, and perhaps Charleston, and Birmingham, Ala., enjoy it also. Those are the cities which the third network indicates, if we could get a third channel in there, they would have a service equal to 98 percent of the other two networks. That, in my opinion, is what he would want if you asked John Q. Public what he would like to have, first.

I was thinking perhaps if we could, according to the standards indicated, permit some reductions in mileage separations, perhaps some adjustments in power, so that we do not destroy more service than we provide, that that would take care of almost a compelling need.

And that thereafter, we could do a very thorough, solid, sound job, which I know sounds long and delayed, because we speak in terms of 5 or 10 years, but actually they fly by pretty fast. And if we come up with a good sound position that we don't have to change—and I am talking about the Government of the United States—I think that is the best service you can perform for the people.

Senator PASTORE. Let me ask you: Is this technically feasible? I mean, has it been proved out?

Mr. DOERFER. No. We have submitted a proposal asking for comments. I am satisfied on the first go-round, it looks feasible—it looks possible. But I have been around too long not to know that you can be disabused by first impressions. I think the rulemaking process is a good one.

Senator PASTORE. Who is going to prove the feasibility of this? Do you mean the applicants?

Mr. DOERFER. No. We have certain engineering data and ground rules that we start with. It may be from the industry. You sometimes get the more cogent and intelligent reasons against a proposed rule from the opponents. We discount all of their selfish interests. We know that they exist. There is not anybody, really, here who does not admit he has a selfish purpose. We cut through that. We cannot, just because it has selfish motives, disregard legitimate criticism of a proposed plan.

Senator PASTORE. I understand that. But is this on a vote of 4 to 3?

Mr. DOERFER. Yes. But I think, if I may characterize the vote, it is primarily a question of how we get from here to there, and what we do in the meantime.

I am satisfied that some Commissioners think that is premature—talking about the minority—and if I may characterize their feelings correctly, they feel it may unduly delay, or delay longer, the ultimate transition to UHF.

If you are of a mind that the UHF is the absolute solution, in 1960, and if you feel that the dislocation will not be too severe, and if you feel that people will not lose service, then obviously you should vote that way.

I have just come to the opposite conclusion, and I might—well, I was going to add, I don't think I have been wrong in this thing, ever since I got on the Commission, or since I have adopted the view that I have, with respect to UHF.

Senator PASTORE. Well, now, gentlemen, it is 20 minutes to 1. I understand you want us to see some slides.

Mr. DOERFER. Well, I really think it would be most helpful to this committee if our staff could just give you some visual aid in the difficult problems that have confronted the Commission in the past 6 years.

Senator PASTORE. What is the pleasure of the Commissioners? Does anyone else here expect to present any side of this issue? You have substantially covered your presentation, haven't you?

Mr. DOERFER. Yes. May I suggest the rest of this be presented for the record?

Senator PASTORE. That will be inserted in the record.

Mr. DOERFER. With the exhibits? And Commissioner Ford's statement?

Senator PASTORE. We will have that included in the record also.

(The balance of Chairman Doerfer's prepared statement, together with the attached tables and a draft of the legislation proposed, as well as the prepared statement of Commissioner Ford regarding negotiations with the OCDM are set forth as follows:)

Mr. DOERFER. The price is the mutual interference created between existing and new short-spaced stations. Up to a point, it may be said in individual cases that the additional service may justify curtailing the service rendered by an existing stattion, particularly if the interference is sufficiently limited and falls in an area adequately served by other stations. In seeking norms which could appropriately be applied, the Commission has tentatively concluded that new, short-spaced VHF stations should be considered only in circumstances where it is possible to prevent more interference to existing stations than that to which they would be subjected if cochannel stations with maximum antenna heights and powers were located at the minimum mileage separations provided for in the rules. This does not mean that there would be no loss of service. While, for example, in zone I embracing the more densely populated northeastern part of the United States the transmitters of cochannel VHF stations are required to be at least 170 miles apart, in practice, since the important centers which must be served are unevenly spaced, the typical saparation to the first ring of surrounding cochannel stations is considerably higher. Thus the designation of a new short-spaced station would inevitably

curtail to some degree the service now being rendered by these stations. Limiting the new interference to the amount to which these stations would be subjected if new stations were placed with maximum facilities at the minimum separation would require suppression of the new station's radiation toward existing stations by reduction of maximum permissible power and, if needed, by directionalization of the signal. From an allocations standpoint the problem here is to find situations in which a new station with radiation so suppressed could nevertheless render an efficient service on a competitive footing reasonably comparable with that of the other stations serving the area. It would hardly serve the general purpose if new stations were squeezed in under circumstances which, while cutting down the service areas of existing stations, would preclude effective service from the new station.

In general, what this appears to mean in practice is that substandard cochannel separations may progressively tend to approach the point of diminishing returns. That is, the shorter the separation, the more questionable it becomes as to whether the interference which will be caused to existing stations could be justified in terms of the amount of new service which a new station with correspondingly reduced power could render. This will be illustrated in detail in a separate presentation following this opening statement.

Since the introduction of short-spaced VHF channel assignments introduces questions whose resolution will depend upon comparisons between services gained and services lost, it becomes necessary to establish a suitable basis for ascertaining the range of interference-free, noise-limited television signals and of assessing the objectionable effects of interfering signals. The presently available standards were developed prior to 1952 for use in the nationwide television reallocations adopted in the sixth report and order. Since then a considerable amount of additional data have been made available and new assessments have been made of the requirements of a satisfactory signal, taking into account present receiver design. Studies of these data by TASO and Commission engineers indicate that the service and interference values previously established can and should be modified and refined. To this end the Commission on January 4, 1960, issued a notice of proposed rulemaking in docket No. 13340 in which new engineering standards and values were announced for comment by interested parties. While the Commission desires to conclude that proceeding as speedily as possible, it is necessary to recognize that the reevaluation of television engineering standards involves considerable complications and a reasonable time must be allowed for responses from industry. In an effort to expedite the matter the Commission had designated February 19, 1960, the last date for filing comments. But well-founded petitions requesting an extension of time were filed by industry members; and in all the circumstances the Commission felt that it would be unreasonable not to allow at least an additional 60 days, which was provided for in an order adopted last week.

In the same notice the Commission announced general criteria which it believed suitable to apply in deciding which markets could appropriately be designated for the consideration of short-spaced VHF assignments. Those criteria were stated as follows:

(*a*) The assignment would make possible a second or a third VHF television station in an important television market.

(*b*) The need for the additional service outweighs the need for any service lost as a result of additional interference to existing stations.

(*c*) The new VHF service would not have substantial adverse effect on established UHF television services.

(*d*) A new assignment would not require an excessive number of channel changes of existing stations.

They will be subject to further review on the basis of comments received.

Without burdening the committee with details I would like also to mention the legal and procedural problems which we find beset us in endeavoring to take prompt action providing for a limited number of new short-spaced VHF assignments. The Commission has examined in detail a number of representative instances and, as was to be expected, existing license rights become involved. This arises in several ways. First there is a problem of existing stations operating on channels where short-spaced assignments may be proposed. Second, it happens in some instances that a short-spaced "squeeze in" cannot be made without collateral changes of existing stations in other cities. Unless existing stations consent to such modifications of their licenses as may be involved they can as a matter of right demand adjudicatory hearings which introduce a very substantial element of delay, taking into account the opportunities afforded for judicial review of Commission decisions. We must therefore candidly face the fact that the remedial benefits which may be derived from short-spaced VHF assignments are not only limited in terms of the numbers of such assignments which can be justified in view of the interference which is created, but also that due process and the imposing array of applicable procedural requirements indicate the possibility—I would say probability—of quite considerable delay in individual cases.

Since the submission of my report of last April, the Commission and its staff have given high priority to the resolution of the numerous problems involved both in the projected long-range programs and in the effort to seek interim improvements. Not only have these matters been considered at length in virtually all of the regular meetings of the Commission, but they have additionally been the subject of a number of special Commission meetings. The technical group comprising staff members of both the Commission and OCDM have held 26 meetings to coordinate their continuous study of the factors involved in a major shift of frequencies from Government use to television broadcasting. Meanwhile, the staff of the Broadcast Bureau and the Office of the Chief Engineer has given top priority to the numerous technical and other problems posed by the interim program envisaged in my previous report.

Since last April, final action has been taken to assign a second VHF channel to Baton Rouge, La., and to Columbus, Ga., and a third VHF channel to Corpus Christi, Tex. Proceedings have been initiated looking toward the assignment of a third VHF channel in the Grand Rapids-Kalamazoo television market and at Providence, both markets now being served by only two locally assigned VHF stations.

Additionally, the Commission has invited and is now considering comments in rulemaking initiated last July, looking toward the possible assignment of two additional VHF channels to Fresno and to Bakersfield, Calif., which would bring the VHF assignments in those cities up to three apiece. The problems posed in that proceeding are particularly difficult and are currently receiving the Commission's attentive consideration. In another proceeding initiated last July the Commission is considering comments on the desirability of adding a VHF channel to Sacramento or San Francisco, Calif., and a commercial and noncommercial assignment to Reno, Nev. In an additional action taken last July the Commission inaugurated rulemaking looking toward the possible assignment of a third VHF channel at Birmingham, Ala. Also under consideration in that proceeding are possibilities for a second VHF assignment in Montgomery, Ala.

At this point, Mr. Chairman, I offer for the record a series of tables updating the statistical information appended to my report of last April. Also for the record is a draft of suggested legislation empowering the Commission to establish standards for television receivers.

In this opening statement I have touched only briefly on some of the technical problems which limit the available choices in determining television allocation policy. These factors have such a critical bearing on the problem that I would like, with your permission, to ask Mr. Hart Cowperthwait, Chief of the Rules and Standards Division of the Commission's Broadcast Bureau, to present them to you with graphic illustrations which have been prepared for this purpose. First, however, I would like to call upon Commissioner Ford to summarize for you the status of the discussions conducted to date with OCDM.

APPENDIX A

STATISTICAL APPENDIX

TABLE 1.—*Television station data as of Jan. 23, 1960*

	Total	Commercial	Noncommercial
VHF stations:			
On the air	476	442	34
Not on the air	42	35	7
Total authorized	518	477	41
UHF stations:			
On the air	88	77	11
Not on the air	128	113	15
Total authorized	216	190	26
All stations:			
On the air	564	519	45
Not on the air	170	148	22
Total authorized	734	667	67

TABLE 2.—*Analysis of commercial television station grants made since July 1952 (as of Jan. 23, 1960)*

	VHF	UHF	Total
Total postfreeze CP's issued	419	373	792
Number canceled:			
Before going on air	42	132	174
After going on air	7	51	58
Total	49	183	232
Number outstanding:			
On the air	335	77	412
Not on air:			
(*a*) Had been on the air but now off the air	1	44	45
(*b*) Never on the air	34	69	103
Total	370	190	560
SUMMARY			
Total stations that went on the air	343	172	515
Nhmber of stations now off the air:			
Number	8	95	103
Percent	2.3	55.2	20.0

TABLE 3.—*Number of postfreeze commercial TV stations in operation, July 1952 through Jan. 23, 1960*

Time period	Number of VHF stations			Number of UHF stations		
	Going on the air	Going off the air	Total on air end of period	Going on the air	Going off the air	Total on air end of period
July 1952–December 1953	121	1	120	123	2	121
January–December 1954	69	3	186	25	29	117
January December 1955	49	0	235	9	27	99
January December 1956	37	0	272	6	14	91
January–December 1957	28	0	300	12	19	84
January–December 1958	27	2	325	4	11	77
January–December 1959	13	4	334	10	11	76
January–January 23, 1960	1	0	335	1	0	77
Total [1]	343	8	335	172	95	77

[1] These columns do not add to the totals shown since some stations went on the air and off the air more than once. The totals reflect the number of different stations which went on the air or off the air during the entire period.

TABLE 4.—*Analysis of commercial UHF operating experience, by type of TV market (as of Jan. 23, 1960)*

	Number of TV markets	Percent of of total
1. All TV markets in which UHF went on the air	117	100
All UHF stations have gone off the air	62	53
Some UHF stations have gone off the air and some are still on the air	10	9
All UHF stations are still on the air	45	38
A. TV markets which are UHF only [1]	53	100
All UHF stations have gone off the air	21	39
Some UHF stations have gone off the air and some are still on the air	3	6
All UHF stations are still on the air	29	55
B. TV markets which are UHF-VHF [1]	64	100
All UHF stations have gone off the air	41	64
Some UHF stations have gone off the air and some are still on the air	7	11
All UHF stations are still on the air	16	25
2. The 64 UHF-VHF markets classified by whether UHF operation was before or after VHF:		
A. UHF before VHF	29	100
All UHF stations have gone off the air	16	55
Some UHF stations have gone off the air and some are still on the air	4	14
All UHF stations are still on the air	9	31
B. UHF after VHF	35	100
All UHF stations have gone off the air	25	71
Some UHF stations have gone off the air and some are still on the air	3	9
All UHF stations are still on the air	7	20

[1] These classifications refer only to be types of assignments available in the immediate TV market, i.e., whether such assignments are UHF-only or both UHF and VHF.

TABLE 5.—*Annual volume of advertising in the United States for selected years, 1949–58*

A. MILLIONS OF DOLLARS

Media	1949	1952	1955	1958
Newspapers	1,915	2,472	3,088	3,193
Magazines	493	616	729	767
TV	58	454	1,025	1,354
Radio	571	624	545	616
All other [1]	2,165	2,990	3,807	4,372
Total	5,202	7,156	9,194	10,302

B. PERCENT OF TOTAL

Newspapers	36.8	34.5	33.6	31.0
Magazines	9.5	8.6	7.9	7.5
TV	1.1	6.3	11.2	13.1
Radio	11.0	8.7	5.9	6.0
All other [1]	41.6	41.9	41.4	42.4
Total	100.0	100.0	100.0	100.0

[1] Includes farm publications, direct mail, business papers, outdoor advertising, weekly newspapers, transportation advertising, cost of company advertising departments, etc.

Source: "Printers' Ink Advertisers Guide to Marketing for 1960."

TABLE 6.—*Volume of national and local advertising by medium, 1958*

A. MILLIONS OF DOLLARS

Medium	Total	National	Local
Newspapers	3,193	769	2,424
Magazines	767	767	
Television	1,354	1,106	248
Radio	616	248	368
All other [1]	4,372	3,441	931
Total	10,302	6,331	3,971

B. PERCENT OF TOTAL

Newspapers	31.0	12.1	61.0
Magazines	7.5	12.1	
Television	13.1	17.5	6.3
Radio	6.0	3.9	9.3
All other [1]	42.4	54.4	23.4
Total	100.0	100.0	100.0

[1] Includes farm publications, direct mail, business papers, outdoor advertising, weekly newspapers, transportation advertising, cost of company advertising departments, etc.

Source: "Printers' Ink Advertisers Guide to Marketing for 1960."

TABLE 7.—*Total television set production showing number and percent equipped with UHF tuner, 1953–59*

Year	Total TV set production	With UHF tuner	
		Number	Percent
1953	7,214,787	1,459,475	20.2
1954	7,346,715	1,383,486	18.8
1955	7,756,521	1,181,788	15.2
1956	7,387,029	1,035,236	14.0
1957	6,399,345	779,800	12.2
1958	4,920,428	418,256	8.5
1959	6,349,380	435,571	6.9
Total	47,374,205	6,693,612	14.1

NOTE.—The above total of 6,693,612 UHF sets represents only factory-equipped UHF sets and does not include VHF-only sets which were converted by local servicemen to receive UHF either by the addition of a converter or a strip. Although no precise estimate has ever been made of the number of sets converted locally, there are indications that the number of such sets would not be greatly in excess of 2 million. Thus total sets that have been equipped for UHF (whether or not they are now being used to receive UHF) can be estimated at approximately 8.5 million.

Source: EIA.

TABLE 8.—*Analysis of non-TV homes*

The March 1958 study by Advertising Research Foundation estimated that 8,140,000 households (16 percent of the total) did not own TV sets. It cannot be concluded from this that such homes lacked TV service since it was found that about half of the non-TV homes (4.1 million) were located in counties where total TV set ownership was 80 percent or better. The following table shows the distribution of non-TV homes by the various levels of TV set ownership in the county:

Non-TV homes

	Number	Percent of total non-TV homes
Counties with TV set ownership of:	*Millions*	
90 percent or over	1.9	23.9
80 percent or over	4.1	49.9
70 percent or over	5.3	64.9
60 percent or over	6.4	78.9
50 percent or over	7.6	92.9
34 percent or over [1]	8.1	100.0

[1] No county was estimated to have less than 34 percent TV set ownership.

TABLE 9.—*Bureau of Census projections of population, 1960–80*

[Population as of Jan. 1, 1960, 179,300,000]

	In millions	
	Low estimate	High estimate
On July 1:		
1960	179.4	181.2
1970	202.5	219.5
1980	230.8	272.6

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Alabama	Birmingham	2		1	
	Decatur		1		
	Dothan	1			
	Florence		1		
	Mobile-Pensacola, Fla	3			
	Montgomery	1	1		
	Huntsville		1		
Arizona	Phoenix-Mesa	4			
	Tucson	3		1	
	Yuma	1			
Arkansas	El Dorado	1			
	Fort Smith	1			
	Little Rock-Pine Bluff	3			
California	Bakersfield	1	2		
	Chico-Redding	2			
	Eureka	2			
	Fresno-Tulare	1	2		
	Los Angeles	7			
	Sacramento-Stockton	3	1	1	
	Salinas-Monterey	1			
	San Diego	2			
	San Francisco-Oakland	4		1	
	San Jose	1			
	San Luis Obispo	1			
	Santa Barbara	1			

See footnote at end of table, p. 4648.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Colorado	Colorado Springs-Pueblo	3			
	Denver	4		1	
	Grand Junction	1			
	Montrose	1			
Connecticut	Bridgeport		1		
	Hartford-New Haven-New Britain-Bristol	2	2		
	Waterbury		1		
District of Columbia	Washington	4			
Florida	Fort Myers	1			
	Jacksonville	2		1	
	Miami-Fort Lauderdale	3		1	
	Orlando-Daytona Beach	3			
	Panama City	1			
	Tampa-St. Petersburg	2	1	1	
	West Palm Beach	2			
Georgia	Albany	1			
	Atlanta	3			1
	Augusta	2			
	Columbus	1	1		
	Macon	1			
	Savannah	2			
	Thomasville-Tallahassee, Fla	1			
Idaho	Boise	2			
	Idaho Falls-Pocatello	2			
	Lewiston	1			
	Nampa	1			
	Twin Falls	1			
Illinois	Champaign-Urbana	1	1	1	
	Chicago	4		1	
	Danville		1		
	Harrisburg	1			
	La Salle		1		
	Peoria		3		
	Quincy-Hannibal, Mo	2			
	Rockford	1	1		
	Springfield-Decatur		2		
Indiana	Evansville-Henderson, Ky	1	2		
	Fort Wayne		3		
	Indianapolis-Bloomington	4			
	Lafayette		1		
	Muncie		1		
	South Bend-Elkhart		3		
	Terre Haute	1			
Iowa	Cedar Rapids-Waterloo	3			
	Davenport-Rock Island-Moline	2			
	Des Moines-Ames	3		1	
	Fort Dodge		1		
	Sioux City	2			
Kansas	Ensign	1			
	Garden City	1			
	Goodland	1			
	Great Bend	1			
	Hays	1			
	Topeka	1			
	Wichita-Hutchinson	3			
Kentucky	Lexington		2		
	Louisville	2			1
	Paducah	1			
Louisiana	Alexandria	1			
	Baton Rouge	1	1		
	Lafayette	1			
	Lake Charles	1	1		
	Monroe	1		1	
	New Orleans	3		1	
	Shreveport	2			
Maine	Bangor	2			
	Portland-Poland Spring	3			
	Presque Isle	1			
Maryland	Baltimore	3			
	Salisbury		1		
Massachusetts	Adams		1		
	Boston	3		1	
	Greenfield		1		
	Springfield-Holyoke		2		
	Worcester		2		

See footnote at end of table, p. 4648.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Michigan	Cadillac	1			
	Detroit	3			1
	Flint-Lansing-Saginaw-Bay City	3	1		
	Grand Rapids-Kalamazoo	2			
	Marquette	1			
	Traverse City	1			
	Onondaga	1		1	
	Cheboygan	1			
Minnesota	Alexandria	1			
	Austin-Rochester-Mason City, Iowa	3			
	Duluth-Superior, Wis	2			
	Minneapolis, St. Paul	4		1	
Mississippi	Columbus	1			
	Greenwood	1			
	Jackson	2			
	Meridian	1			
	Tupelo	1			
	Laurel	1			
Missouri	Cape Girardeau	1			
	Columbia-Jefferson City	2			
	Joplin-Pittsburg, Kans	2			
	Kansas City	3			
	Kirksville-Ottumwa, Iowa	1			
	St. Joseph	1			
	St. Louis	4		1	
	Sedalia	1			
	Springfield	2			
Montana	Billings	2			
	Butte	1			
	Great Falls	2			
	Glendive	1			
	Helena	1			
	Missoula	1			
Nebraska	Hay Springs	1			
	Hayes Center	1			
	Hastings	1			
	Kearney	1			
	Lincoln	1		1	
	North Platte	1			
	Omaha	3			
	Scottsbluff	1			
	McCook	1			
Nevada	Las Vegas-Henderson	3			
	Reno	1			
New Hampshire	Manchester	1			
New Mexico	Albuquerque	3		1	
	Carlsbad	1			
	Clovis	1			
	Roswell	1			
New York	Albany-Schenectady-Troy	3			
	Binghamton	1	1		
	Buffalo-Niagara Falls	3			1
	Carthage-Watertown	1			
	Elmira		1		
	New York	7			
	Plattsburgh-Burlington, Vt	2			
	Rochester	2			
	Syracuse	2			
	Utica-Rome	1			
North Carolina	Charlotte	2			
	Greensboro-High Point-Winston-Salem	2			
	Greenville-Washington	2			
	Raleigh-Durham	2			
	Wilmington	1			
North Dakota	Bismarck	2			
	Dickinson	1			
	Fargo	2			
	Grand Forks	1			
	Minot	2			
	Valley City	1			
	Williston	1			

See footnote at end of table, p. 4648.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Ohio	Akron		1		
	Cincinnati	3			1
	Cleveland	3			
	Columbus	3			1
	Dayton	2			
	Lima		1		
	Toledo	2			
	Youngstown-New Castle, Pa		3		
	Zanesville		1		
Oklahoma	Ada	1			
	Ardmore	1			
	Lawton	1			
	Oklahoma City-Enid	3		1	1
	Tulsa	3		1	
Oregon	Eugene	1			
	Klamath Falls	1			
	Medford	1			
	Portland	3			
	Roseburg	1			
Pennsylvania	Altoona-Johnstown	2	1		
	Erie	1	1		
	Harrisburg-Lancaster-York-Lebanon	1	4		
	Philadelphia	3			1
	Pittsburgh	3		1	1
	Wilkes-Barre-Hazleton-Scranton		3		
Rhode Island	Providence	2			
South Carolina	Anderson		1		
	Charleston	2			
	Columbia	1	1		
	Florence	1			
	Greenville-Spartanburg-Asheville, N.C	3	1		
South Dakota	Aberdeen	1			
	Florence	1			
	Reliance	1			
	Rapid City	2			
	Sioux Falls	1			
	Deadwood	1			
Tennessee	Bristol-Johnson City	2			
	Chattanooga	3			
	Jackson	1			
	Knoxville	2	1		
	Memphis	3		1	
	Nashville	3			
Texas	Abilene-Sweetwater	2			
	Amarillo	3			
	Austin	1			
	Beaumont-Port Arthur	2			
	Big Spring	1			
	Brownsville-Harlingen-Weslaco	2			
	Bryan-College Station	1			
	Corpus Christi	2			
	Dallas-Fort Worth	4			
	El Paso	3			
	Galveston-Houston	3		1	
	Laredo	1			
	Lubbock	2			
	Lufkin	1			
	Monahans	1			
	Odessa-Midland	2			
	San Angelo	1			
	San Antonio	3	1		
	Texarkana	1			
	Tyler	1			
	Waco-Temple	2			
	Wichita Falls	2			
Utah	Salt Lake City-Provo	4		1	
Vermont	(see New York)				
Virginia	Harrisonburg	1			
	Norfolk-Portsmouth-Newport News-Hampton	3			
	Richmond-Petersburg	3			
	Roanoke-Lynchburg	3			

See footnote at end of table, p. 4648.

TABLE 10.—*Listing of 272 [1] TV markets with stations in operation (as of Jan. 23, 1960)*—Continued

State	TV market	Stations in operation			
		Commercial		Noncommercial	
		VHF	UHF	VHF	UHF
Washington	Bellingham	1			
	Ephrata		1		
	Kennewick-Richland-Pasco		1		
	Seattle-Tacoma	5		1	
	Spokane	3			
	Yakima		2		
	Walla Walla		1		
West Virginia	Charleston-Oak Hill-Huntington-Ashland, Ky.	4			
	Clarksburg	1			
	Bluefield	1			
	Parkersburg		1		
	Wheeling-Steubenville, Ohio	2			
Wisconsin	Eau Claire	1			
	Green Bay-Marinette	3			
	La Crosse	1			
	Madison	1	2		1
	Milwaukee	3	1	1	
	Wausau	1			
Wyoming	Casper	1			
	Cheyenne	1			
	Riverton	1			
Alaska	Anchorage	2			
	Fairbanks	2			
	Juneau	1			
Hawaii	Hilo	1			
	Honolulu	3			
	Wailuku	3			
Puerto Rico	Mayaguez	1			
	Ponce	2			
	San Juan	2		1	
Guam	Agana	1			

[1] The 272 TV markets have a total of 519 commercial (442 VHF and 77 UHF) and 38 noncommercial stations (28 VHF and 10 UHF) in operation. In addition, the following 6 TV markets have only 1 noncommercial VHF station in operation: Andalusia, Ala.; Munford, Ala.; Gainesville, Fla.; Durham, N.C.; Chapel Hill, N.C.; and Corvallis, Oreg. One TV market has only 1 noncommercial UHF station in operation: Oxford, Ohio.

PROPOSED AMENDMENT GIVING FCC JURISDICTION OVER TELEVISION RECEIVERS

I

Amend section 303 of the Communications Act of 1934 (47 U.S.C. 303) by adding thereto a new subsection (s) so that with the addition it will read in part as follows:

"SEC. 303. Except as otherwise provided in this Act, the Commission from time to time, as public convenience, interest, or necessity requires shall—

* * * * * * *

"(s) have authority, whenever the objectives of this Act so require, to prescribe minimum performance capabilities for apparatus designed to receive television pictures broadcast simultaneously with sound, when such apparatus is traded or shipped in interstate commerce for sale or resale to the public.

II

Also further amend the Communications Act of 1934 (47 U.S.C. 151–) by adding thereto a new section 330 as follows:

"SEC. 330. No person shall trade or ship in interstate commerce for sale or resale to the public apparatus described in subsection 303(s) unless it complies with minimum performance capabilities prescribed by the Commission pursuant to section 303(s); *Provided* that this section shall not apply to carriers transporting such apparatus without trading in it."

Mr. FORD. Early in 1959, Commissioner Craven and I conferred with top officials of OCDM concerning the possibility of some reallocation of VHF spectrum space as between Government and non-Government use. The primary objective of these discussions was to ascertain whether some additional VHF space could be obtained for television. Pursuant to these discussions, it was concluded that the need for spectrum space to meet unsatisfied requirements was sufficiently urgent to warrant a comprehensive study of the radio spectrum. This study would look toward a proposal that would assure the most efficient technical use of the spectrum, keeping in mind that such a rearrangement might require the moving of some services from one portion of the spectrum to another and consequently obsoleting the equipment used in those services. The initial phase of this study was limited to a technical evaluation of the radio propagation factors influencing the choice of frequency and the equipment presently used at each portion of the spectrum. This part of the study was undertaken by a special task force under the chairmanship of a representative of OCDM and consisted of top technical personnel from the Office of the Chief Engineer of the FCC, frequency allocation experts from the Army, Navy, Air Force, Treasury Department, Coast Guard, and FAA, as well as other Government agency users. This group commenced its technical study in April of 1959 and worked through mid-December of 1959, at which time a report was submitted to the OCDM and the FCC. The first phase of this technical study which was completed December 15, involved the 50–1215 mc. band since most of the more pressing current frequency allocation problems lie in this range.

In the course of compiling this report, a complete and candid consideration of the requirements, both Government and non-Government, frequencies was conducted. The equipment investment already in use or committed for various frequencies was carefully studied and full and complete information is documented and available for consideration of the members of this Commission and top officials of OCDM. The technical group found that three major areas must be considered in connection with any substantial revision of the existing allocation plan as between Government and non-Government. These problem areas centered about (1) the propagation characteristics necessary to achieve optimum efficiency for specific purposes, (2) the economic factor, that is, the investment in equipment for services established on specific frequencies by the Government and by the public, and (3) international allocations of the radio spectrum and other international considerations.

As I have indicated earlier, this report has only recently been made available to the Commission. It is our intention to evaluate the contents of this report and to proceed with policy discussions with top

officials of OCDM at the earliest possible date. Until we have had an opportunity to explore the long-range policy aspects of this technical report with OCDM, it will be impossible for the Commission to determine specifically whether alternatives (a), (b), and (c) mentioned in the Chairman's statement of April 22, 1959, are at all feasible. I might say, however, that based on my examination of this document, the prospects of obtaining additional VHF spectrum space for use of television do not appear to be favorable at this time. It is impossible, however, to give the committee a complete evaluation of the joint efforts of the OCDM and the FCC until completion of our work. It is hoped that this can be completed in the near future and a determination made of the most practical possibilities of solving the present television allocation problem.

(The following represents further oral colloquy at the current hearing.)

Senator PASTORE. You have essentially stated your position?

Mr. DOERFER. Yes.

Senator PASTORE. Mr. Craven, did you plan to make a presentation?

Mr. CRAVEN. No, sir.

Senator PASTORE. Mr. Cross?

Mr. CROSS. No, sir.

Senator PASTORE. Mr. Hyde?

Mr. HYDE. I have discussed this question with the committee many times. I have nothing further to add.

Senator PASTORE. Mr. Bartley?

Mr. BARTLEY. No, sir.

Senator PASTORE. Mr. Lee, you wanted to make a presentation?

Mr. LEE. I was hoping my statement could be incorporated in the record, the statement I submitted last July.

Senator PASTORE. If we are going to come back at 2 o'clock to see these slides, if you want to make a résumé. I don't want to shut anybody off because, let us face it, this is the body that will determine what direction we are going. We want everyone heard, and I am very much interested in getting everybody's point of view.

Let's see. It is a quarter to 1. Let's make it 2:30. It will give you a chance to get a good lunch.

(Whereupon, at 12:45 p.m., the hearing was recessed, to be reconvened at 2:30 p.m. of the same day.)

AFTERNOON SESSION

Senator PASTORE. Come to order, please.

Mr. DOERFER. Mr. Chairman, there remains the visual-aid demonstration and Commissioner Lee's statement. I would suggest that you permit us to go on first with the slides, and if there is any time remaining, Commissioner Lee has indicated that he would be happy to make a statement, and if not, to file it.

Senator PASTORE. All right. Could we arrange this slide machine in such a way that the reflection would be toward the back of the room, and we would move on that side so that everyone could see it.

Mr. DOERFER. I think so.

Senator PASTORE. Is that possible?

Mr. DOERFER. Yes.

Senator PASTORE. I mean, all you have to do is turn that around and bring the screen here. Let's not make a Federal project out of this. [Laughter.]

Mr. COWPERTHWAIT.[1] This presentation will attempt to show graphically some of the considerations which are involved in the various allocation plans that were discussed this morning.

The first slide that we will show is a view of the spectrum, which we don't expect to be too controversial.

This shows the spectrum from 0 to 300,000 megacycles and the overlay, in yellow, from 54 to 890 megacycles, is the frequencies that are under consideration today.

Mr. DOERFER. That covers the entire 82 channels?

Mr. COWPERTHWAIT. Yes.

The next slide is a standard view of the frequencies—an expanded view of the frequencies from 54 to 90 megacycles. The next series of overlays will show how the various plans fit into this spectrum.

The first overlay shows the part of the spectrum that is, by executive agreement, allocated to Government and therefore not under the control of the Commission.

The next overlay, in blue, will show the space that is presently allocated to television. The so-called low VHF channels are in two bands, channels 2 to 4, between 54 and 72 megacycles, and channels 5 and 6, between 76 and 88 megacycles. The high VHF television channels are between 174 and 216 megacycles. The 70 UHF channels are assigned the space between 470 and 890 megacycles.

The remaining frequencies in this section of the spectrum are assigned to industrial, police, fire, maritime, amateurs, and many other miscellaneous services.

Although the inability of UHF stations to compete effectively with VHF stations is, of course, a serious obstacle, the Commission has had to consider, as one alternative allocation, the continuation of the present system. A second alternative would be to confine all television to the present 12 VHF channels and abandon the UHF frequencies completely, or confine their use to boosters, satellites, and other secondary uses. Such a policy would necessitate shorter separations between stations on the same channel, and for reference purposes this policy will be further referred to as the short separation plan later on.

A third policy has been considered, and that is abandon the 12 VHF frequencies and confining assignments to UHF.

The next overlay will show a fourth policy that has been under consideration. This is known as the 50-channel plan. The present VHF channels would be retained and the high VHF band would be extended to 444 megacycles in order to provide a total of 50 channels. The UHF band would be reallocated to other services. This arrangement would require reallocating all but 6 megacycles of the Government channels in the space between 216 and 450 megacycles.

The next overlay shows an alternative arrangement for obtaining 50 channels. In this plan channels 2 to 6 would be reallocated to other services, but channels 7 to 13 would be retained and extended to 474

[1] Hart S. Cowperthwait, Chief, Rules and Standards Division, Federal Communications Commission.

megacycles, to provide a total of 50 channels. As before, the UHF channels would be reallocated to other services.

This would require reallocating to other services all the Government channels in the space between 216 and 450 megacycles, as well as the assorted other services in the space between 450 and 470 megacycles, principally safety, aviation, amateur, meteorological, marine, industrial, and common carrier.

The next overlay shows a sixth policy that has been under consideration. This is known as the 25-channel plan. Under this plan the 5 low VHF channels and the 70 UHF channels would be reallocated to other services. The high VHF band would be extended to 324 megacycles, making room for a total of 25 channels, the additional space being obtained from the Government, amateurs, and others.

Senator PASTORE. Will someone at this point explain what is the difference between this and the one that takes in the full release of the Government channels, the 50 channels, as against the 25?

Mr. COWPERTHWAIT. This proposal requires obtaining the channels—will you indicate them on the map there, on the green there—that area from the Government. Now, in the 50 channel plan, which we will show on an alternate slide——

Senator PASTORE. You don't have to put the slide back.

Mr. COWPERTHWAIT. That takes the whole Government band.

Senator PASTORE. What does that do to them? That means they would have to give it up?

Mr. COWPERTHWAIT. They have to give it up and exchange it for some other frequencies that we would relinquish, perhaps the UHF band or the low V's.

Senator PASTORE. Are you saying that they could do as well on the UHF as they are doing on the VHF?

Mr. COWPERTHWAIT. No. I wish I could say that. That would have to be worked out between the Government and the—with the FCC and the Government.

Mr. FORD. That is the process we are now engaged in.

Senator PASTORE. I see. But merely for the purposes of the record, so that this can be better understood, you would have a tougher job negotiating this agreement with the military for 50 channels than you would with the 25 channels?

Mr. FORD. Presumably, yes.

Senator PASTORE. Well, presumably. I mean as a matter of fact?

Mr. FORD. Well, it is obvious if you ask them for 50 channels it is more difficult for them to move out of all 50 channels than it is for them to move out of 25 channels.

Senator PASTORE. In other words, the likelihood of achieving the 25-channel plan is much better than the other two?

Mr. FORD. Oh, yes.

Senator PASTORE. What will that do as a matter of a nationwide competitive system? Could you work it out as well on the 25-channel plan as you could on the 50?

Mr. FORD. Don't you have some further plans that show the effect of the 25-channel plan on the nationwide system, and the 50-channel plan on the nationwide system?

Mr. COWPERTHWAIT. Yes.

Senator PASTORE. Fine. I wish you would explain that, because after all, the other Senators are not here to see this, and all we have to show them is the record.

Mr. COX. Is the Government's use of the channels shown there in green relatively uniform? I mean, are they making substantial usage of all portions of the frequencies now under their control, or is their usage concentrated?

Mr. DOERFER. Commissioner Ford?

Mr. FORD. They are used generally throughout that whole portion. The extent and the concentration in particular frequencies we are not able to tell you.

Senator PASTORE. I see. And whether or not they can get along with an alternative?

Mr. FORD. That is what we have to discuss.

Senator PASTORE. All right.

Mr. COWPERTHWAIT. The next slide attempts to show pictorially how the strength of the television signal gradually diminishes with distance. The slide compares a typical low VHF service area with a UHF service area. The dotted circle on the next overlay indicates the normal service area of the stations in the absence of interference.

The next slide will show the same distribution of service in a more specific manner. The heavy brown circle at 74 miles is the normal service area of a low VHF station, as was shown by the dotted circle in the preceding slide. The so-called normal service area merely defines the point where at least half of the locations obtain a satisfactory picture. From the moment the television signal leaves the transmitter it begins to deteriorate. Even at short distances from the transmitter there are some locations which do not receive service due to terrain irregularities. The fine circles on the chart indicate the percentage of locations which receive service at various distances from the transmitter.

At 56 miles at least 90 percent of the locations receive a satisfactory signal. At 74 miles, 50 percent of the locations receive a satisfactory signal, this being the normal service area. However, a satisfactory signal is received far beyond this normal contour. For example, at 98 miles 10 percent of the locations receive just as satisfactory a signal as 90 percent of the locations are able to obtain at 56 miles.

Under actual operating conditions the location contours would not be uniform circles, but irregular lines, as shown on this next slide, typical of the coverage in rather rough terrain.

Note that in some areas very close to the transmitter only 70 percent of the locations receive a satisfactory picture, while in other areas much farther from the transmitter as high as 90 percent of the locations receive a satisfactory picture.

For the illustration shown we chose a station operating on the low frequencies with 100 kilowatts power and 750 feet antenna height. The coverage will vary, of course, with power and antenna height. It will also vary with frequency and the amount of interference it receives from other stations. We would like now to illustrate the effect of both frequency and interference on coverage.

First we shall discuss the subject of interference. Since the early days of television the question of how far apart to assign TV stations

on the same channel has been under almost continuous study. The television freeze of 1948–52 stemmed directly from this matter. The problem can be stated quite simply. If stations on the same channel are separated far apart, each station serves a wide area, but only a few stations can be assigned throughout the country on each channel. On the other hand, if stations on the same channel are squeezed together at short separations, many stations can be assigned on a single channel, but each station will only serve a smaller area, due to interference with other stations.

There is an optimum separation which results in the greatest aggregate service area. In the VHF band this occurs when stations are separated by about 200 miles. This is approximately the average separation presently employed in the eastern half of the country under the existing allocation plan.

The efficiency decreases gradually as the separation is reduced, and at 100 miles has decreased about 25 to 35 percent. Putting it another way, 25 to 35 percent more spectrum space is needed to provide the same amount of service area if separations are reduced from 200 miles to 100 miles. This condition is illustrated graphically in the next slide.

The first slide shows the normal coverage of a typical VHF station operating without any intereference from other stations. The first overlay shows how the service area of the station is reduced when it is surrounded by other stations 200 miles distant. That is the present line. The service area has been reduced from 14,000 square miles to 10,000 square miles. The interference there, of course, is represented by the solid blue.

The next overlay shows that if the station is surrounded by stations only 100 miles distant, its service area is reduced to 1,700 square miles.

The next overlay attempts to show that, by reducing the separations from 200 miles to 100 miles, it is by simple arithmetic possible to assign four times as many channels in the same area—the result being that in the given area, instead of 1 station serving 10,000 square miles, there are now 4 stations each serving 1,700 square miles, for a total of 6,800 square miles.

In the next overlay, the service areas——

Mr. DOERFER. Just a moment. At this point, that is 6,800 square miles as compared to 14,000 miles. I wish to highlight how the service is reduced in circumstances where you increase the number of channels.

Mr. COX. It is only as compared to 10,000 square miles, based on your present separation, is it not?

Mr. COWPERTHWAIT. That is right.

Mr. COX. When you talk about normal service area here, is this based on your present rules or the proposals pending in the rulemaking proceeding?

Mr. COWPERTHWAIT. Roughly on the normal grade B contour or normal service area, they are comparable.

In the next overlay the service areas of the four stations on the bottom of the chart, represented by the solid red circles, have been placed inside the circle at the top of the chart for the purpose of illustrating in a pictorial manner that the total area coverage of stations placed 100 miles apart is considerably less than the total area covered by stations 200 miles apart, even though there are four times as many

stations at the 100-mile separation. While the total area served by the close-spaced stations decreases, the population may increase considerably under the short separation plan; this is because the additional stations permitted under the short-spaced plan will be concentrated in centers of population. Generally speaking, this tends to penalize the outlying rural areas, although this effect is alleviated to some extent due to the fill-in provided by the additional stations. The effect of a practical short-space plan applied to the northeast section of the country will be shown later.

In the preceding example we assumed all stations throughout the country to be spaced exactly the same distance apart. This is sometimes referred to as a lattice network or uniform grid. From a theoretical point of view the uniform grid type of allocation is most attractive, particularly at the short spacings. Such an allocation provides a large number of stations and uniform coverage. The grid ideas received very close study at the time of the Sixth Report in 1952 and again, early in our current allocation studies, possibilities of a grid allocation were again reexamined. Each time, however, we have been forced to abandon the idea because of insurmountable economic barriers. Regardless of how the grid is constructed, the apexes of the grid usually fall in rural areas—and often as not, miles from cities which could support a TV station. It is doubtful whether applications would be filed for stations which do not include fairly large centers of population within their primary service areas. Another reason for locating stations in the city is that a higher level of signal strength is necessary in the city to overcome the effects of manmade electrical interference such as elevators, motors, and automobile ignition. We have come to the conclusion that because of the irregular geographical distribution of our cities, it is not practical from an economic standpoint to adopt a uniform grid allocation.

Summarizing the foregoing it is apparent that the decision with regard to the spacing and arrangement of stations is both an economic and a technical problem. Before an allocation plan is drafted, a policy decision must be reached with regard to individual station coverage vis-a-vis number of stations. Whether or not a uniform grid system is adopted, stations will tend to be built near the cities. Any plan in which the service areas of individual stations are limited because of interference or other reason will tend to penalize outlying rural areas, and if carried to extremes, reduce the service area of individual stations below that which is needed for sound economic support.

In all of the plans to be discussed today, the station assignments are placed in the centers of population and, as a result, the spacing between stations varies widely in accordance with the natural geographical distribution of cities.

We have shown the effect of interference on coverage; we will now show the effect of frequency on coverage. The circles on this first slide show the normal individual station coverage under each of the six plans, in the absence of interference. As the number of channels in the plan is increased, the average frequency becomes higher, which results in correspondingly lower average service areas. The two circles at the top show the average coverage provided by stations in the existing plan and the short separation plan. Since both of these

plans operate on the same frequency band they have the same service radii, in the absence of interference. In the example shown the service radii is 66 miles. The three circles in the lower half of the chart show the coverage of the 25-channel plan, the 50-channel plan, and the UHF plan. The service radii are 58 miles, 51 miles and 41 miles, respectively. In practice, as was illustrated earlier, the coverage of stations operating in the existing plan or the short separation plan would have their coverage reduced due to interference. This effect is shown on the next overlay. The service radii of existing plan stations are reduced from 66 miles to 57 miles and the service radii of short separation plan stations are reduced from 66 miles to 46 miles. There is no reduction in service area in the other plans because sufficient channels are available to space stations beyond interference range.

Comparing the short separation plan with the UHF plan, it develops that, due to interference, stations in the short separation plan have only a slightly greater coverage than stations in the UHF plan. Although new propagation curves for both UHF and VHF have not yet been standardized, it appears that when VHF stations are surrounded with other cochannel stations with an average separation of no more than 150 to 170 miles, the radius of coverage will be roughly reduced to the equivalent of the average of the interference-free UHF stations. This, of course, neglects other inherent characteristics in the two bands such as, for example, the deeper shadows produced on the UHF frequencies.

We have shown that there is a gradual decrease in the size of the service area of a TV station as the frequency is increased, the most pronounced difference occurring between a station on a lower VHF frequency with a normal service area of 66 miles and a UHF station with a service area of 40 miles. The difference in coverage between UHF and VHF is not due to any single factor. Rather it is an accumulation of differences beginning with the time the picture leaves the camera at the studio until it reaches the picture tube in the home receiver. This next slide tends to trace the signals over their respective paths and shows where the differences occur.

We have found it convenient to divide the total path between the transmitter and receiver into eight compartments as shown across the top of the first slide. These compartments are (1) the transmitter, (2) the transmitting antenna, (3) the signal propagation, (4) electrical noise, (5) the receiving antenna, (6) the lead into the receiver. (7) the receiver itself and (8) last, the picture tube.

We are going to assume that we have two complete systems side by side, one UHF and one VHF, each with identical transmitter powers. The red line on the graph will indicate the gains and losses of the UHF signal and the blue line, the gains and losses of the VHF signal.

Assuming, therefore, that the output of both the UHF transmitter and the VHF transmitter is the same, the next link in the transmission path is the transmitting antenna. Transmitting antennas have the capability of concentrating the power in the direction of transmission. The result is a gain in useful radiated power over the original transmitter power output. Because of inherent characteristics, it is feasible to build a UHF antenna with a higher gain than a VHF antenna.

In the illustration, we have indicated a VHF antenna gain of 6 power units and a UHF gain of 16 power units. Therefore, at the end of the second leg, the UHF signal is above the VHF signal by 10 power units.

The third link is the propagation path. This is the path of the signal after leaving the transmitting antenna, up to the point where it is picked up by the receiving antenna. UHF signals are more subject to absorption and dispersion by foliage, hills, buildings, et cetera, so that considerably less of the signal arrives at its destination. In this example we have shown, for a typical case, a loss of 40 power units for UHF and a loss of only 30 power units for VHF. Thus, by the time the UHF signal reaches the receiving antenna, it has, in the example shown, lost the 10 power units advantage that it acquired at the transmitting antenna, and so the signals would again be equal at this point. However, the VHF receiving antenna will, in addition to picking up the VHF signal, also pick up certain electrical noises, such as ignition noises, which are completely absent on UHF. Therefore, the VHF signal must be correspondingly stronger to override this interference. To allow for this characteristic we have penalized VHF 8 power units at that point. Therefore, the useful UHF signal at the receiving antenna is still 8 power units ahead of VHF.

The relative effects of the receiving antenna on the signal are shown in two steps. Since the length of the UHF antenna is inherently small, compared to VHF, it picks up less signal. We have shown this on the chart by a loss of 17 power units on UHF and a gain of 3 power units on VHF. However, since the elemental length of the UHF antenna is small it is possible to place more units in parallel so that part of the loss is made up as shown. In the example we have shown a gain of 10 power units for UHF and only 4 power units for VHF. The net effect of the receiving antenna is a gain of 14 power units for VHF. The VHF signal is now, for the first time, above the UHF.

The next link in the transmission signal path is the lead-in from the antenna to the receiver. We have shown a loss of 5 power units for UHF and only 2 power units on VHF to account for the lower efficiency of the lead-in at higher UHF frequencies.

The last step in the transmission path is the receiver. All receivers generate a certain amount of unwanted noise within their own circuits. UHF receivers have a higher level of this internal noise than VHF receivers. To overcome this relative disadvantage requires a greater UHF signal. We have shown this relative characteristic by a loss of 17 power units in the UHF receiver but only 13 power units in the VHF receiver.

We have now traced signals through the entire system. Beginning with equal power at the transmitter we have shown, in a typical case, that by the time the signal reaches the picture tube the UHF signal has lost 53 power units and the VHF signal has lost only 40 power units, or a net difference of 13 power units in favor of the VHF. For simplicity, we have only shown on this chart the comparative characteristics of low VHF and UHF signals. Since the average frequencies of the other plans are in between low VHF and UHF, their plots on these charts would fall in between the values shown. The net difference between UHF and VHF which we have illustrated would ordinarily not be observable on the received picture except in areas of low signal strength.

Mr. Cox. When you say the power is equalized, is that absolutely, or has any adjustment been made for the fact that UHF stations are permitted to operate at higher power?

Mr. COWPERTHWAIT. No adjustment was made in this case. We presumed that both stations——

Mr. Cox. Started out with exactly the same kilowatts.

Mr. COWPERTHWAIT. That is right. So we could make a more fair comparison if you wanted to trace a signal. In a more typical case the UHF transmitter would have a higher gain of 5 or 10.

Mr. Cox. Even so, the diagram would indicate that when the signals reach the antenna the UHF signal is about equal within the VHF signal. It is from that point in, in the receiving array—the antenna, lead-in, and the set—that the maximum difficulty is encountered?

Mr. COWPERTHWAIT. Yes; that is correct.

We will now turn to our maps showing the comparative coverage of the various plans. For this purpose we have selected as a test area the northeast quarter of the country. The first slide shows this test area, using a population density map as a base. The density of population is indicated by the size and distribution of the dots and the darkened areas. The next slide will compare the existing plan and the short separation plan with respect to areas receiving at least one VHF service. The area shown in blue on this first overlay receives at least one service under the existing VHF plan.

Mr. LEE. That is the short-spaced plan?

Mr. COWPERTHWAIT. This is the existing plan. I am going to superimpose on that the short space plan. First let us show the coverage of the short space plan. This is the coverage provided by the short space plan.

Now we will superimpose the two and you see the relative coverage. The area in green——

Mr. FORD. What separations are you using in the shortspaced plan?

Mr. COWPERTHWAIT. A minimum of 100 miles but an average of 107 miles. The area served by both plans appears on the superimposed map as green. The area served only by the existing plan and lost under the short separation plan remain blue. The areas served only by the short separation plan remain yellow. Due to interference, the service areas of the individual stations are smaller in the short separation plan than in the existing plan. Therefore if assignments were made to the same cities in each plan, the existing plan would provide greater coverage. However, examination of the superimposed maps shows that it has been possible to provide service to additional cities under the short separation plan.

This additional service area gained is more than offset by the service area lost due to smaller individual station coverage. The area lost is usually in the rural areas between large cities. The area gained is usually in medium-sized cities where new channels can be fitted in, such as in Scranton, Youngstown, and Lexington, Ky., and similar cities. Many of these areas are currently receiving service from local UHF stations.

Senator PASTORE. Do you mean to say that on this short separation plan that we discussed today, that if that were put into effect there would definitely be certain losses?

Mr. COWPERTHWAIT. There would be losses in outlying rural areas. This, Senator, is not the same plan that we have proposed in our rulemaking. This assumes that we are starting from scratch and that channels are allocated as low as 100-mile minimum spearation.

The plan that we are proposing in our rulemaking is a temporary procedure in which we would squeeze in stations without a complete reallocation.

Senator PASTORE. Would there be any losses in that plan?

Mr. COWPERTHWAIT. There might possibly be certain rural areas that would lose to the exclusion of gains in the large cities.

Mr. COX. But there would be possibility that the loss of one signal might be in an area receiving other services not affected by the interference, so that there might not be total exclusion of service?

Mr. COWPERTHWAIT. That is true. In fact that is one of the criteria that we set forth in our rulemaking. We could decide which stations would be assigned on the basis of gains and losses as a result of the assignment.

Mr. COX. But this indicates that where the blue shows now there would be no service at all from VHF stations?

Mr. COWPERTHWAIT. That is correct.

Mr. LEE. In the Northeast section, do you know what kind of a separation you would have to use in order to replace the existing UHF services in those relatively few like Springfield, Mass., Wilkes-Barre, Pa., Youngstown, Newcastle, Harrisburg, perhaps?

Mr. COWPERTHWAIT. We are showing, of course, that Wilkes-Barre is covered with the short separation plan. You meant just to cover those few?

Mr. LEE. What I am saying is: Could you replace, under reasonable separations, the existing U's with V's in the Northeast?

Mr. COWPERTHWAIT. No, you could not.

Mr. LEE. You could not?

Mr. COWPERTHWAIT. No.

Mr. LEE. So, in some areas you would still be dependent on the U?

Mr. COWPERTHWAIT. That is correct, because this is only one station—this is a single station coverage, this map. Now, the next map is going to show what we can do with five stations, and this will show a more pronounced difference between the two plans.

Mr. BARTLEY. I think there is one point that ought to be made here about the so-called short separation interim plan. The facilities to be provided in that will not be comparable to the existing facilities; they will be subject to directional antennas, lower power and such as that, to avoid or prevent as much fringe area interference as possible.

Mr. COWPERTHWAIT. Yes. Under the existing proposal to assign additional VHF stations at short separation, we are proposing to protect the existing stations to the equivalent of our present separation.

Senator PASTORE. How about the quality of the picture on the new station that is dropped in? Is it as good?

Mr. COWPERTHWAIT. It would be just as good, up to the point where interference resulted.

Mr. COX. Do you have any idea—supposing in just very broad terms, that you were to drop a V in at 150-mile separation, do you have any idea what its probable service area coverage would be as compared to a protected V?

Mr. COWPERTHWAIT. Well, between 150 and 170 miles, if both stations operated at the same power, they would have their service areas reduced to between 40 and 45 miles, depending upon how we finally stabilized our propagation charts. If one station were to be protected, he would be protected out to his present coverage, which is probably around 55 miles. That would mean the new station would have to reduce its coverage to perhaps 35.

Mr. COX. Now you are going to give the existing station less protected radius than you showed as his actual service area now, because you were talking about 66 miles there, weren't you?

Mr. COWPERTHWAIT. That is true, because the average separation now is around 200. We are only going to protect him to 170, because that is what he was entitled to under our present rules.

Mr. COX. It is really in that excess-coverage area that the interference would occur, because you are going to require the station dropped in to avoid interference in the area that would have been occupied by the existing station if it had actually been operating at minimum separation?

Mr. COWPERTHWAIT. That is correct.

The next slide will compare the coverage of the two plans with respect to the areas receiving five services. The area shown in yellow receives five services under the short separation plan. Superimposing the areas, as shown in blue, which receive five services under the existing plan, shows the relative coverage of the two plans. The areas served by both plans now appear as green. Areas served by only the existing plan and lost under the short separation plan remain blue. The areas served only by the short separation plan remain yellow. It is obvious that the short separation plan is more effective in providing multiple services to the large population centers.

The next slide will illustrate the comparative coverage of the 50-channel plan and—well, I was going to skip that 50-channel plan. But we will run through it hurriedly.

Mr. DOERFER. I think so. Why don't you get into that UHF thing? If we have time, we will go back to this.

Mr. COWPERTHWAIT. All right. We will skip the 25-channel plan and 50-channel plan and show the coverage provided by the UHF plan.

The next slide will illustrate the comparative coverage of the 70-channel plan and the existing plan. That is, the all-UHF plan and the existing plan. The first two overlays will compare the two plans with respect to areas receiving at least one service. The area shown in red on this first overlay receives at least one service under the UHF plan. On this second overlay the area shown in the blue receives at least one service under the existing plan.

Superimposing the two slides shows the relative coverage of the two plans. The area served by both plans now appears on the superimposed maps as maroon. The areas served by the existing plan and lost under the UHF plan remain blue. The areas served only by the UHF channel plan remain red. It is apparent that there is a considerable amount of area served by the existing plan and not served by the UHF plan, due to the greater service-area coverage of indi-

vidual stations in the existing plan. It is technically feasible to assign UHF stations which will cover these unserved areas if assignments are made to smaller cities.

Mr. DOERFER. May I clarify just one point? Would you go back to that blue?

Mr. Chairman, the caption there, "UHF Plan," we probably should have an overlay indicating that that is the present VHF plan. Is that true?

Mr. COWPERTHWAIT. That is right; yes.

Mr. COX. Or is it VHF and UHF, both?

Mr. COWPERTHWAIT. This is the present V plan.

Mr. DOERFER. As he puts the blue slide on that, UHF should change to VHF.

Mr. COWPERTHWAIT. It is technically feasible to assign UHF stations which will cover these unserved areas if assignments are made to smaller cities.

In this next overlay we will show the additional UHF coverage provided if UHF assignments are added to smaller cities, in a few cases below 10,000 population where there is no other service available.

You can see that assigning these channels to the smaller cities completely blankets, with few exceptions, the test area. No assignments are made to cities that do not have at least one standard broadcasting station. As a result of these additional assignments, there are only a few small unserved locations in the entire test area. Superimposing this overlay on the existing VHF coverage, it is apparent that the UHF serves more area than the VHF.

This can be seen on the illustration by comparing the blue, which is VHF service not duplicated by UHF, with the red areas which are UHF service not duplicated by VHF.

In addition, because of the greater number of channels available, there would be more opportunity to provide translators and boosters.

Mr. COX. Some of that blue is in the Atlantic Ocean or in Canada, isn't it?

Mr. COWPERTHWAIT. That is a little unfair. [Laughter.] The next slide will compare the coverage of the two plans with respect to areas receiving five services. The area shown in red receives at least five services under the UHF plan. Superimposing the areas (as shown in blue) which receive five services now under the existing plan shows the relative coverage of the two plans.

The area served by both plans now appears on the superimposed maps as maroon. The area served by the existing plan and lost under the UHF plan remains blue. The area served only by the UHF plan remains red.

So you see you have considerable additional coverage, considerable additional multiple service coverage on the UHF plan. And, of course, on the 50-channel plan, if we did show it, we would get the same effect of the better coverage on multiple services.

Although we did not prepare anything on this, there was some discussion on this about deintermixture. We have a couple of slides to show the two plans that the Commisison considered. The one first here is a limited deintermixture plan.

The areas shown in cross-hatching are existing UHF areas. Now, in this limited deintermixture plan, the proposal was to expand these areas into the nearby one—VHF areas, and that area is shown by the solid black. Some of the cities that would lose a VHF channel under that proposal would be in Connecticut, Hartford, and New Haven; in Illinois, it would be Champaign, Urbana, Rockford; in Indiana it would be Evansville; and then up in Michigan there is that big block of cities that are adjacent to the UHF area through central Indiana and Illinois there. Those are, by city, Flint, Grand Rapids, Jackson, Kalamazoo, and Lansing, all of which have the one station. They would be converted to UHF.

There is an area down in South Carolina there, Columbia, Greenville, and Spartanburg, all of which would lose one VHF channel and convert that into UHF.

Now, a second plan that was considered was an expanded——

Mr. Cox. In the case of the Michigan cities there, you would be moving into areas that do not have, with the exception of Saginaw or Bay City, that do not have UHF stations in the area? So you would be going into areas where you would not start with UHF conversion?

Mr. Cowperthwait. That is right, we would not be faced with UHF conversion.

Mr. Cox. Whereas in the Connecticut Valley, Indiana, and to a certain degree in North Carolina, you would start with at least some carryover from the conversion that now exists.

Mr. Cowperthwait. Yes; that is correct.

Now, the second proposal that was considered is a further expansion of these UHF centers. I will not name all the cities, but you can see for yourself that it would encompass a good many large metropolitan areas—Indianapolis, Cincinnati, Dayton, Columbus, and so forth—all of which have two and three VHF stations on the air.

Mr. Doerfer. May I make an observation?

You will note that the red here does not really get into highly populated areas, so that the net contribution to the UHF problem is mostly on an area basis rather than on a population basis.

Mr. Ford. Would the white areas have V coverage?

Mr. Cowperthwait. Yes; the white areas show—those circles that are indented in the red area are 40-mile VHF service radii. We, just for the purpose of illustration, assumed that the influence of VHF stations would extend out to about 40 miles.

Mr. Cox. That would mean total coverage on the area shown in red? In other words, UHF would provide—from cities now having stations—would provide that much coverage?

Mr. Cowperthwait. No; that is not quite true.

Mr. Cox. You would have to fill in some additional areas?

Mr. Cowperthwait. You would have to fill in, and there might be areas that would not support a UHF station economically.

Mr. Doerfer. If I may interject again, you would have to make an adjustment in this picture for the overspill of the VHF service beyond the 40-mile radius, and you would find an awful lot of people just would not accept, or convert their VHF sets, if they could get even but one VHF signal. That has been our experience.

Mr. Cox. Of course, if this legislation that you suggest were adopted, the only sets they would get eventually would be UHF, if you adopted any program using UHF frequencies?

Mr. DOERFER. Yes; but when you are talking about selective deintermixture and the proposed amendment, or the proposed law, you may be able to effect an all-channel set; but you could not compel the family to receive the UHF signal, and without substantial support from the users, the UHF, in many instances, would be in just as much trouble economically as it is today.

Senator PASTORE. Is this the last slide?

Mr. COWPERTHWAIT. If you like, we have one or two additional slides that we will just show, and it will take about 5 minutes.

On the next series of slides are going to show some field surveys made by TASO which make direct comparison between UHF and VHF signals under the same set of conditions. These comparisons will be shown for three types of terrain: smooth, rough, and very rough. The first comparison is for smooth terrain with little vegetation and thus favoring UHF propagation. The topography of the area under test is shown on the bottom half of the chart. This shaded area is a plot of the elevation of the ground above sea level, beginning at the base of the antenna and extending out from the transmitter a distance of 65 miles. The vertical scale for the lower chart is graduated in feet above sea level; thus it can be seen that the elevation over the entire path of 65 miles varies only about 70 feet.

Mr. Cox. That is out of Philadelphia, is it?

Mr. COWPERTHWAIT. Yes, sir.

The height of the antenna above ground is 500 feet. It is obvious that there is excellent line-of-sight transmission to all areas in the path of the signal.

The first overlay will be a plot of the VHF signal strength against distance from the transmitter. The vertical scale on the left is graduated in units of signal strength and the horizontal scale is marked off in miles from the transmitter. The horizontal blue line is the level of signal required at the receiving antenna for a normally usable picture. At a point about 65 miles from the transmitter, the signal level falls below this level, thus we can assume that the normal service area of the station extends out to about this distance. The area between 60 and 70 miles is the beginning of the so-called fringe area service, where a usable picture can usually be obtained with a more elaborate antenna.

The next overlay is a plot of the UHF signal strength against distance, under the same conditions as the VHF. The horizontal red line is the signal level required at the receiving antenna for a normally usable picture. You can see that the level of the signal falls below that required for normal service at about 55 miles.

The two charts will now be superimposed so that a direct comparison of the propagation of the two signals can be observed. The level of signal required for a normal UHF picture is considerably greater than that required for a VHF picture. The reason for this difference in requirements can readily be seen by referring back to the previous comparative step chart. That chart showed that there was a difference of 21 power units required to make up for the loss in the receiving antenna and the receiver, itself. Therefore, to recover these lost

power units and obtain the same level of picture quality at the receiving tube will necessitate raising the level of the UHF signal at the receiving antenna by the 21 power units lost.

I refer back and forth to this other chart, but I won't take the time to do that.

There is a significant difference between the two signals at the edge of the normal service area. While the VHF signal tapers off gradually in this area, remaining only slightly below the level required for a usable picture, the UHF signal plunges quite rapidly below the level required for a usable picture. The result is that there is considerably less fringe area service on the UHF. It has been found generally true, in practice, that the UHF signals attenuate more rapidly beyond the normal service area. Of course, the reason this UHF signal shows up so favorably here is because of the smoother terrain.

The next chart will show the comparative coverage with rougher terrain. The elevation in this comparison varies over a range of 1,500 feet.

Now, if you will add on here both the UHF and the VHF——

Mr. Cox. This is out of Wilkes-Barre, is it?

Mr. Cowperthwait. Yes, sir.

Seen here, the gyrations of the signal are more severe both in VHF and UHF. Of course, the UHF is more severe than the V. The VHF signal drops out at about 75 miles, and the UHF signal drops out around 55 miles, and there are many areas where the UHF signal drops out between the transmitter and the place where it finally drops out altogether.

We will just show the last slide quickly.

It shows very rough terrain. Without much explanation, you can see that as the terrain becomes progressively rough, the extent of the service area and the gyrations of the signal become progressively greater.

Mr. Doerfer. There it drops out at between 20 and 30 miles for the UHF and about 40—what is it? Is it 38 miles?

Mr. Cowperthwait. Yes, about 38 miles, it drops out completely on V.

Mr. Doerfer. On the U?

Mr. Cowperthwait. On the U, it drops out completely at about 28 miles, and on the V, it drops out completely at about 38 miles.

Mr. Lee. In this area they are using community antennas to fill in, aren't they?

Mr. Cowperthwait. Yes. There are a number of community antenna installations in this area.

Mr. Cox. When respective signal strengths are shown below that required for normal services, does that mean that you get no picture or that you get a degraded picture?

Mr. Cowperthwait. When it is below the level, it means that the picture is——

Mr. Cox. Is unusable?

Mr. Cowperthwait. Well, there are opportunities, of course, to adjust the receiving antenna to find the best location.

Mr. Cox. These are 30-foot heights?

Mr. Cowperthwait. Yes. Perhaps you could find one of these peaks in your area, maybe on your rooftop.

Senator PASTORE. That quorum call is for a vote. We may have to be leaving any minute now.

I think we ought to wind this up with Mr. Lee. If he has anything to say, I think we ought to give him an opportunity to say it.

Mr. LEE. Mr. Chairman, I could say it very quickly. There are just one or two points I would like to make.

Senator PASTORE. All right. Go ahead.

Mr. LEE. I think, No. 1, I think we have been talking, or perhaps emphasizing too much what the existing situation is.

Now, I think that we have a responsibility to worry about not only today but 20 or 30 or even 50 years from now. Everyone knows what is happening to this country in the way of expansion, and we are certainly not going to get along with 12 VHF channels, which is the only thing that perhaps is left under this so-called interim plan.

Senator PASTORE. Bob, we are sorry now. We will have to interrupt you. You will have to put it in the record.

Mr. LEE. May I insert my statement?

Senator PASTORE. Yes.

(The statement of Commissioner Robert E. Lee, originally dated July 8, 1959, and editorially revised January 19, 1960, is as follows:)

SUMMARY

Mr. LEE. I cannot subscribe to a course of television allocation that is fraught with uncertainty and delay while we have the UHF channels necessary to have an adequate and truly competitive television system.

The majority's long-range plan is "long" in trouble and expense and "short" in its ultimate results. Since it is filled with conjecture as to how many channels can be made available by the military, there can be no rational interim plan. The road one takes is often dictated by where one intends to go. The Commission's intention to obtain 50 VHF channels is not realistic. We are more likely to find ourselves with a 12-channel system or at lest a 25-channel system. Such eventualities would appear to require a significant reduction in mileage spacings between stations in order to provide an efficient and equitable distribution of channels.

If an all-UHF plan were to be implemented, no need would exist to require manufacturers to build good UHF sets at reasonable prices. The Commission's interim plan to assign stations at substandard spacings would certainly kill UHF operations.

The UHF may be the only choice left to the Commission for an adequate television system. A shortsighted disposition of these frequencies will cast the pattern of television allocations for generations to come.

In 1956 we enunciated our intentions to transfer television broadcasting to UHF and gave sound reasons for our decision. Now, the Commission stands ready to repudiate all of these findings without so much as a hint that we were in error in that decision. If TASO findings are responsible for this switch, the report to Congress fails to say so.

The Commission says deintermixture is "ineffectual." However, it only made four relatively minor markets all-UHF. What is to be expected from such a mild program?

There are many areas where UHF stations would prosper were the areas to be made all UHF.

TASO didn't give us what we asked in 1956 despite the urgings of its director. All of the apprehensions of our staff as to these results are now fulfilled.

I don't need TASO to see that UHF stations, for economic reasons, are employing modest facilities in small markets, and are plagued with poorly designed receivers and poorly installed receiving antennas. When TASO says that VHF is superior to UHF, it means that the transmission and receiving facilities are more elaborate and efficient. UHF stations are pulling themselves up by their bootstraps without much help or encouragement from the Federal Communications Commission.

I have demonstrated, by graphs of field intensity measurements over smooth, rough, and very rugged terrain, that from the standpoint of propagation the UHF signals are essentially equivalent to VHF signals. The trouble lies with the equipment at either end of the UHF transmission path. It is within our ingenuity to overcome such deficiencies. Our engineers in both Government and industry have told us how. I, for one, have sufficient faith in American industrial ingenuity to believe that whatever problems exist in present receiver design would soon be eliminated if there were a sufficient market for the sets.

The Commission, if it were to be successful in obtaining 50 VHF channels for television, intends to assign 5 channels to each of the top 100 markets. This plan would not only deprive vast rural areas of television service, but would disregard the needs of smaller communities to have their own facilities and result in an inadequate number of channels assigned to the very cities which the Commission intends to favor.

An all-UHF system permits vast flexibility with the distinct possibility of assigning as many as 35 channels to any given city and to permit small communities to have their own stations. Such flexibility can be expected to result in all portions of the United States having television service. Moreover, present UHF stations would not be left out in the cold and the prospect of educational broadcasting would be tremendously brighter.

Our staff has demonstrated that UHF can be expected to adequately serve large cities by conventional broadcasting techniques, and a superior service by new techniques which are entirely reasonable and economical.

If the time were to ever arrive that even 70 UHF channels were found to be inadequate, utilizing present spacings, such spacings as 50 miles between UHF stations give a superior service to VHF stations spaced at 100 miles. Accordingly, 4 times as many assignments can be made on each UHF channel, utilizing multicasting, as would be feasible with each VHF channel.

The Commission's plan, which would permit only one additional channel to New York City, for instance, can hardly be expected to satisfy the requirements of the future. Even before the plan is off the drafting boards it is obsolete.

The costs of an all-UHF receiver would at best be only slightly greater than present all-VHF receivers. There are strong indications that they would even be cheaper.

The cost of conversion to an all-VHF system, even if it were possible, puts the burden of expense not only on the peope who want to see television and who would have to convert to receive the new channels but would also place a tremendous burden on all taxpayers to convert military equipment here and possibly abroad. We cannot now estimate how many taxpayers' dollars would be wasted to obtain such a "one horse" television system.

The many communities which have UHF translators would find that if there were any channels available for their operation the need for conversion to new frequencies would be accompanied by a highly limited service to prevent interference among themselves and to regularly licensed television stations.

I have suggested an efficient use of the 12 VHF channels which would take care of the needs of communications, common carriers and the many services of nonbroadcast nature that the Commission could license in the safety and special radio services. Placing these services in UHF makes a far less efficient allocation than would result if they were permitted to operate in the VHF portion of the spectrum. The Commission staff advises that such an allocation as I have suggested would take care of the country's nonbroadcast radio service needs for 30 years.

I consider such uses of the spectrum to be imperative to the growth of industry and hence to our national protection.

I point to three possible alternatives whereby the television industry could be moved to UHF. I favor one that permits VHF stations to operate on at least two channels (UHF and VHF) until an orderly conversion has been accomplished.

The "economy" of scarcity in television channel assignments has resulted in many unhealthy situations which the Commission has attempted to alleviate. This scarcity frustrates the Commission's comparative hearing processes.

Educational broadcasting, which is on the threshold of its vast potential, can thrive when equivalent assignments are made for such operations.

If I may indulge in a hackneyed expression, the Commission's plan would provide too little too late.

To Senate Interstate and Foreign Commerce Committee: I appreciate this opportunity to submit my views. At the outset, I want to make it clear that I agree with the statement of the majority in many particulars. I commend them for coming to grips with the television allocations problems. This is not a simple matter.

As a matter of fact, I had been hopeful that I might conceivably be able to concur with my fellow Commissioners in a reasonable course of action. I regret that I cannot.

I cannot quarrel with the objectives of the majority opinion, and I bear expert testimony to the sincerity of that effort. However, to me the fact is inescapable that all the long-range VHF objectives are inadequate and visionary. Even if these plans could be achieved, they are so time-consuming that they may only be implemented by generations as yet unborn. The implementation of the so-called in-

terim plan means the utter, complete, and immediate end of UHF broadcasting. It is a dangerous, costly, and confusing course fraught with conjecture as to the ultimate outcome.

Reasonable men disagree and, with all due respect to my fellow Commissioners, I believe that the studies thus far made lead to a conclusion so inescapable that the committee should ask, not what course of action we should take but why we have delayed in the only evident course—a conversion to UHF.

The majority opinion has adequately posed the problems and the various alternatives available and I do not propose to duplicate this effort, preferring to attempt to persuade you of the merits of my proposal to transfer television to the UHF rather than quarreling with the language of the majority opinion.

My fellow commissioners would be satisfied with a lesser number of channels. They say from 25 to 50 would suffice. With this objective, They open negotiations with the military for an exchange of space. This is an appropriate field for inquiry but lends, in my opinion, little hope of improving the situation within this generation.

THE LONG-RANGE PLAN

Time is a factor of great importance and in the fast-moving electronic art the ultimate problem may bear little relationship to the current problem.

The FCC says that it hopes for a definitive answer within the next few months. Since it would reasonably take the military far longer to emulate its needs in such a drastic action, I submit that the only definitive answer that can be expected within the next few months is "No."

I believe it would take a minimum of 18 to 24 months for some kind of an affirmative offer from the military.

Upon receipt of such an offer, the FCC has committed itself to a review of the needs of all radio services in the current allocations inquiry in docket 11997. This, I would estimate, would require another 3 to 5 years.

Subsequently, a long period of delicate international negotiations would have to take place for other nations must agree to such new uses of the frequencies. If past experience is any criteria, you can expect another 5 to 10 years in this area.

Extensive rulemaking would then be required to determine in which cities the new channels should be assigned. Assuming that new channels would not be intermixed with old ones, present assignments would have to be shifted for I cannot conceive that the Commission would intermix old and new channels.

After all this, a transition period of 10 years or longer is called for. Who can wait this long?

Presumably, the new channels would be largely located in 216–450 megacycle band. This is largely, but not exclusively, occupied by Government. Some 20 percent, or 48 megacycles is allocated to other important services, including amateur.

I would support a requirement that legislation be enacted to require that sets shipped in interstate commerce be manufactured as all-channel sets dependent upon the outcome of these allocations matters. I

should like to observe that an all-UHF system would not require legislation to implement since it is clear that manufacturers would soon recognize the new market potentials for UHF receivers and would be quick to develop and market satisfactory UHF receivers at reasonable prices.

Under the so-called long-range plan such a bill at this time would be of little help. Since it would take years to determine what TV channels we would have, how could the manufacturer at this point comply?

INTERIM PLAN

The implementation of this plan would spell the immediate end of UHF.

The foot in the door could not be pulled back and we would be flooded with substandard applications that would gradually eliminate the allocation plan and reduce the service area of existing stations to something far less than UHF stations serve today.

It would, I believe, perpetuate a substandard 12-channel system with perhaps more stations and less coverage. I would prefer the status quo.

A COMPLETE REVERSAL IN THREE YEARS

The Commission statement traces some of the history of our past mistakes, but I would particularly call your attention to our report and order in the allocation proceeding in Docket 11532, adopted June 26, 1956, which I find still valid. I shall briefly refresh your memory as to what the Commission then decided and compare these decisions with today's trends.

In its report and order, the FCC rejected allocation plans based on obtaining additional channels from the Government since there was no reasonable expectancy of obtaining any significant number of channels.

Today, apparetly, the Government is willing to talk about it. But, they were willing to talk about it then. After a lot of talk, we managed to keep what spectrum space we had. We may be less fortunate on the next go-round. We told you in May of last year conversations were going on. We are up to our ears in studies, but still no channels. I believe a reasonable man is entitled to be skeptical. I am a reasonable man—I am skeptical.

The FCC in 1952 rejected substandard spacing on the theory that the number of assignments that could be made would be inadequate and would make serious in-roads in the service areas of existing stations, as well as inhibit future UHF development.

Today, the Commission, through its interim plan would abandon that finding and plunge into a hit-or-miss allocation plan which has neither engineering standards nor guide lines.[1]

In 1956 we rejected deintermixture as a permanent solution but offered to consider a partial deintermixture to alleviate conditions existing in a limited number of markets.

[1] On Jan. 4, 1960, in docket 13340, the Commission proposed certain standards and criteria for substandard stations designed to protect the service of existing stations. Not only will these low-powered stations fail to compete with other stations in the same market, but operating with such directional antennas as the Commission proposes to license it is entirely conjectural that they would, in fact, render the protection to the service of cochannel stations that they would purport to afford.

Today, the Commission observes that deintermixture was a failure. It points out in page 13, that—

> experience with deintermixture in the intervening years had demonstrated that it is ineffectual as a national policy.

I submit that deintermixture was never given a chance and that we have had no "experience" of consequence because we were unable to muster the votes to gain this experience. Some of the areas presented for deintermixture were: Albany, N.Y.; Hartford, Conn.; Madison, Wis.; Miami, Fla.; Fresno, Calif.; New Orleans, La.; Elmira, N.Y.; Peoria, Ill.; Evansville, Ind., and Springfield, Ill.

Of these numbers the only instances where the Commission removed a VHF channel were in Elmira, N.Y.; Springfield, Ill.; Peoria, Ill.; and Evansville, Ind. I submit that the nationwide effect of these actions could hardly be expected to be substantial.

There were, and still are, many areas in which UHF operations would have more than a fair chance of survival if competing VHF stations were converted to UHF.

It is my view that a broader deintermixture plan, which the majority discards (p. 15) because it could not place some 90 VHF stations elsewhere (except in UHF) and because it would make some 12 million homes dependent on UHF, is only deficient in the respect that it required an arbitrary selection of cities to be transferred to UHF. Certainly, one of the purposes of deintermixture—to make a substantial population dependent on UHF—would be served.

Were it not for the urgency for drastic action forced by the majority view that the UHF be abandoned, I would still adhere to substantial deintermixture as a plan of interim action pending complete reallocation of television in the UHF. I cannot press deintermixture, however, if the FCC is to move headlong into an all-VHF system.

In the 1956 allocation proceeding it was decided that the Commission's efforts should not be concluded without a careful and thorough exploration of a transferral to the UHF band.

Today I feel the task has not been seriously or adequately undertaken. In 1956 the FCC displayed such confidence in UHF that it concluded that an all-UHF system would—

(*a*) Raise the ceiling on the maximum number of stations that could be accommodated in the broadcast system.

(*b*) That the building of additional stations would be encouraged.

(*c*) The problem of receiver incompatibility would be eliminated; and

(*d*) That the discontinuance of VHF television would provide additional frequencies for other services in the VHF region.

Today the Commission has abandoned hope and I fail to understand the reason. In 1956 we launched a program to enhance the coverage of UHF stations particularly concentrated upon uses of increased transmitter powers, new transmitting techniques and upon improvement of UHF receivers and associated antennas. We decided that facts and data should be gathered to permit a full determination as to whether there is justification for the elimination of VHF broadcasting with full expectancy that some of the disparities between UHF and VHF transmission and reception cannot be completely eliminated.

Today, with all due deference to TASO, virtually none of this has been accomplished. Rather, the very disparities which the Commission once conceded have now been proven to exist. I cannot tell whether TASO has influenced the Commission's decision to abandon UHF. I am sure you will not discover the answer to this question in the Commission's statement.

Mission accomplished?

I happen to be a believer in industry committees and, in fact, am using them to a great extent in the defense field for which I have a particular responsibility. I attended several of the TASO meetings and was singularly impressed with the caliber of the men and the zeal with which they undertook their tasks. I was so impressed, as a matter of fact, that I recommended Dr. George Town, ex-secretary of TASO, for a commission in our executive reserve, a commission which, I am highly pleased, he has accepted.

Nevertheless, I must call attention to the fact that while TASO has supplied much valuable information, it has deviated from the purposes which were intended by the Commission.

In our report and order in docket 11532 dated June 26, 1956, the Commission referred to the need for a program of research and development to determine whether or not VHF broadcasting could be eliminated.

In a subsequent public notice the Commission published a letter to certain industry associations calling a meeting to consider a research program, the objectives of which were:

1. To assemble facts relating to the feasibility of transferring the operation of television broadcasting to the UHF spectrum space.

2. If (1) is not feasible, to assemble the facts which support the best of available alternatives.

3. To advise the Commission regarding the technical principles which should be applied to television channel allocations.

In January 1957 the organization formed (TASO) adopted its objectives in significant part as follows:

The objectives of the organization shall be to develop full, detailed and reliable technical information and engineering principles based thereon, concerning present and potential UHF and VHF television service.

On April 3, 1957, Executive Director Town, so the minutes reflect, suggested that in the interest of saving time the panels should confine their studies to UHF. He repeated these suggestions in August 1957, pointing out that concentration on UHF should be undertaken to determine what transmitter powers, what receiver characteristics, what conditions of topography and what transmitting apparatus should be required in order to provide satisfactory service in UHF. He was supported by at least one other member of the board, but a majority apparently felt that their objectives could more properly be met by the course of action subsequently undertaken.

On December 19, 1958, Dr. Town announced that tests on alternate UHF channels were feasible but the matter was referred to panel 2 and no subsequent meetings were held to my knowledge. (In the fall of 1959 the report concerning multicasting, which I discuss on page 13

herein, was referred by the TASO panel coordinating committee to panel 5 which noted it without comment.)

But we had some warning, for on January 13, 1958, the Commission's staff in a formal memorandum pointed out the deviations between TASO and FCC objectives and gave their opinions that TASO would not provide the following:

1. A means of obtaining equivalent performance from a VHF and a UHF installation.
2. A plan for an orderly change from a VHF to a UHF system.
3. A plan for comprehensive deintermixture of VHF and UHF station assignments.
4. A plan for substantially increasing the number of VHF assignments.
5. Or finally, any information that would greatly simplify the Commission's task in evaluating or in providing any of the above courses of action.

We now have the TASO report and all the apprehensions of our technical staff have been fulfilled.

What is wrong with UHF?

I have caused to be made a study of UHF broadcasting. I find that there are several technical reasons that cause UHF comparison with VHF to be so pitiful.

While improving the technical grade of service of UHF stations from an economic point of view may be likened to lifting one's self by his bootstraps, it is significant that these technical deficiencies can be overcome. In a healthy climate I am sure that they would be overcome. I have observed that:

(*a*) UHF operations are typically small.

1. They are located in small communities which national advertisers normally shun.
2. The average UHF installation has an effective height above average terrain of scarcely more than half that of VHF stations (low VHF, 1,034 feet; high VHF, 987 feet; UHF, 640 feet).
3. The effective radiated powers used by UHF stations are considerably less than maximum obtainable as compared with VHF stations (low VHF, 78 percent; high VHF, 66 percent; UHF, 14 percent of 1 megawatt).
4. No tower of a UHF station exceeds 1,000 feet. However, 84 authorized VHF stations have towers in excess of 1,000 feet.
5. Service ranges of UHF stations are limited not essentially by propagation but by poor transmission facilities. The average facility provides a service range of only 28 miles to its grade A contour and 42 miles to its grade B contour.

(*b*) Poor receivers now in use limit ranges of 1 megawatt UHF stations at 750 feet above average terrain to 26 miles to grade 2; 40 miles to grade 3; and 48 miles to grade 4. Parametric amplifiers and better radio frequency sections in receivers could extend these ranges to 32 miles, 48 miles and 55 miles respectively.

(*c*) Average servicemen know little and care less about installing a UHF antenna at an optimum location on a roof. Often inferior practices are observed in connecting the antennas to the receivers. The many UHF receiving antennas are of insufficient height above the

house to clear trees and foliage. The angle of tilt is critical. Educating the serviceman and getting him to take the time and effort to make a good installation may come about through local licensing.

(*d*) Other difficulties, such as small capture area of the UHF antenna and inefficient transmission lines, are susceptible of improvement.

Propagation

The only aspect of television allocation which is fixed and final is propagation. We can improve receivers, antennas, and transmitting techniques to adopt to vagaries of terrain and the shortcomings of propagation.

The TASO report has been the genesis of unfortunate publicity on UHF propagation. The Commission's staff has commented on TASO's so-called critical distance in a memorandum to the Commission dated May 7, 1959. In this memorandum it is observed that: (1) the selection of "critical distance" from widely scattered points is a matter of individual judgment and lacks a well defined transition point; (2) the studies involve an arbitrary selection of criterion. "Good" picture was used when "Passable" may have been more significant for Commission purposes; [it has been brought to my attention that the criterion is somewhere between "Good" and "Passable"]; (3) while the "critical distances" were purportedly based on currently used station powers and antenna heights, it was found by careful study of the TASO discussion that the powers and heights used were averages of the stations surveyed; (4) the staff concluded that critical distance theory is unsuited as an engineering criterion for evaluating service criterion.

I have attached as appendix I three graphs which represent a valid engineering approach to the evaluation of propagation. You don't have to be an engineer to understand them, either.

These graphs show the nature of the terrain along the paths where field intensity measurements were taken, the height of the transmitting antennas, the median field intensities [in my original text I erroneously described these values as field intensities per kilowatt radiated power] measured, which values were adjusted to 25-kilowatt transmitter powers using transmitting antennas comparable in complexity—5 db gain for VHF and 13 db gain for UHF.

Figure A in appendix I is a path over smooth terrain from Philadelphia, while figures B and C are over "rough" and "very rugged" terrains respectively from Wilkes-Barre. In the former case there are VHF and UHF stations in operation. In the latter case there are UHF stations in operation. The VHF measurements were made on an FM station, which corresponds electrically to the low VHF television band.

I stated that these graphs showed median field intensity and a note of explanation is in order. At each measuring site several readings were made and depending on the location—I previously indicated that the antenna was changed in orientation—of the receiving antenna for the measuring equipment, an assortment of high and low values were recorded. The values depicted here are middle or what engineers call median values. This is significant because while at some points the median may drop below the value needed to give a passable picture, a judicious location of receiving antenna could be expected to provide a passable picture.

Another matter that deserves explanation is the fact that on each graph are drawn three horizontal lines. The top horizontal line is the value of 56 dbu, the signal necessary to give a passable picture on a present day UHF receiving installation, the middle line is that signal necessary to give a passable picture with an improved UHF receiver with 10 db less internal noise, and the bottom line is 35 dbu and is that signal necessary to give a passable VHF picture. These lines are at different levels because of the difference in characteristics of receiving antennas and transmission lines connecting antennas and receivers.

Let us look first at figure A which represents smooth terrain with line of sight between the transmitting antenna and virtually all points in the intervening path. It will be observed that, in the absence of interference from other stations, the VHF signal is passable or better to the neighborhood of 60 to 65 miles. The UHF signal dips down below a passable intensity in the neighborhood of 55 miles, regardless of receiver quality, than at greater distances slightly exceeds that necessary, for an improved receiver, at around 58 miles. Beyond these distances pictures on both VHF and UHF are what we call fringe and require a more elaborate receiving antenna than otherwise necessary.

Turning to figure B, which is over rough terrain, it will be observed that the VHF signal is consistently above the line considered necessary for normal service out to a range of more than 70 miles. The UHF signal drops down below the required value in a deep valley at about 18 miles, again at a site of 29 miles, again at about 43 miles. The signal is fairly consistently in excess of that required for present receivers to say 55 miles and to about 65 miles for improved UHF receivers, but beyond these distances the median signals recorded appear to be more consistently below the required values. It is apparent as before that to receive a passable picture in these areas of low intensity a better than average antenna installation is required.

Turning now to figure C it is observed that the median signal for low VHF drops below usable at 36 miles and for UHF at approximately 30 miles with some resurgence at points beyond.

I think that these exhibits demonstrate that from the standpoint of propagation VHF and UHF are comparable regardless of terrain and that UHF, while holding close to par on a general average to VHF, is somewhat more sharply erratic in rugged terrain. This suggests that in rough terrain new transmitting techniques in either VHF or UHF could result in improved service.

The versatility of a 70-channel system

My colleagues have characterized their proposed 50-channel VHF system as "ideal." I have prepared an exhibit which is attached hereto which will prove that a 70-channel UHF plan is far superior to the 50-channel plan from the standpoint of assignment flexibility and coverage capability.

If you will turn to what I have labeled appendix II entitled "Comparison of Service Capabilities of the Television Systems under Consideration," I shall explain.

Considering that, with present minimum spacings between television stations, the maximum number of stations that can be assigned

to a channel, either VHF or UHF, is approximately 50, the maximum number of stations that can be assigned under 12, 25, 50, and 70 channel plans are respectively 600, 1,250, 2,500, and 3,500, as shown in the columns. The next figures are the service radii of the average stations in the respective bands considering an average of 750 feet antenna height above average terrain. These radii are those shown in the majority's statement in appendix B. However, I have added a significant column—the distance to the primary, secondary, and fringe service contours of UHF stations with improved receivers. These figures were supplied to the Commission by its staff in a memorandum discussing the potentiality of the parametric amplifiers. I have attached a copy of this memorandum to my statement. It is numbered appendix III.

It will be observed by comparison of the service radii that the distance to the outer limits of service of the 12-channel and 25-channel systems is quite comparable; that the distance to these contours is several miles beyond the service ranges of stations in the 50-channel system and quite a distance beyond the range of UHF stations with present types of UHF receivers, shown in column (d).

The significance of the potential use of parametric amplifiers becomes forceful when we compare the coverage potentials of the 70-channel system in column (e), with those in the so-called ideal system in column (c).

You will observe that the ranges are 32 miles versus 33 miles for primary service, 48 miles versus 51 miles for secondary service and 55 miles versus 67 miles for fringe service.

Parametric amplifiers cannot be used as advantageously on VHF receivers because the limiting factors in VHF are galactic noise and station interference—see paragraph 2 of appendix III. Accordingly, I have limited my application of parametric amplifiers to the all-UHF system. However, since a portion of the frequencies utilized in the 50-channel plan would fall in the UHF, there can be no doubt that the use of parametric amplifiers in receivers could extend somewhat the range of stations under this plan also.

On the succeeding lines of appendix II the three grades of service areas of each station are computed by simple formula—pi times the radius squared—and cumulative totals are shown by multiplying the service area of stations in square miles by the maximum number of stations which each system could accommodate.

It will be observed from column (e) that 11 million square miles of primary service is possible under the 70-channel plan, which is almost 50 percent more than the nearest competitor, the 50-channel plan shown in column (c).

The cumulative amount of secondary service of the 70-channel plan would be some 25 percent greater than that of the 50-channel plan, while the fringe service would be about 5 percent less.

It should be noted that the gross land and water area of the United States is approximately 3½ million square miles. Thus, it is technically feasible to supply all portions of the country with a number of services with a 70-channel system.

It will be observed that with a uniform distribution of stations 12 channels are capable of providing 2 fringe or better services to the

entire country, a 25-channel system could provide 5 fringe or better services to the entire country, a 50-channel plan could provide 10 fringe or better services, while an all-UHF plan with improved receivers could likewise provide 10 fringe or better services.

It seems to me fair to directly compare the 25-VHF channel system with the all-UHF system for I firmly believe that 25 VHF channels are the most that the Commission could reasonably be expected to ultimately obtain for broadcasting. Accordingly, it will be observed that an all-UHF system would provide just about twice as many services to our country as would a 25-VHF channel system.

When I used the term "uniform distribution of stations," I did not mean to intimate that such a distribution would be economically practical. The significance of this study is to show the relative coverage potentialities of each of the plans from a technical standpoint. It is evident that if it is technically feasible to provide these numbers of services to all areas of the United States, it is likewise technically feasible to provide such numbers of services to any given portion.

I wish to stress that I have been comparing the potentiality of the UHF which the Commission is apparently ready to junk in favor of a system which it calls "ideal."

With a potential of 40 percent more television stations that the 50-channel plan would permit, I submit that the superiority of a 70-channel plan is so obvious from the standpoint of coverage and versatility that I would be remiss in my duty to Congress and the public if I were not to insist on the exploitation of UHF for broadcasting.

Indeed, I am most fearful that what we do today in the matter of television allocations may fix for all time the spectrum space assigned to broadcasting. Any poorly conceived patchwork to our basic system is likely to have a lasting imprint on the future.

SERVICE PROBLEMS IN LARGE CITIES

The Commission acknowledged in 1956 that all the disparities between UHF and VHF could not be completely eliminated, but that it nonetheless was proposing the transfer of television to UHF. The "crash" program, which resulted to determine the feasibility of an all-UHF system, concentrated the greater part of its energies in proving the disparities. I should like to comment briefly on these "disparities," since I believe them to have been the subject of unwarranted notoriety in the trade press.

I have expressed some concern to the Commission and its staff over the problems involved with VHF dropins that because of station separation requirements, transmitters need to be located from 30 to 40 miles from the cities which they were intended to serve. These assignments were made in such a manner as to barely place a minimum required theoretical signal intensity over the principal city.

There have been several glaringly poor assignments, such as in Albany, Miami, and New Orleans, made in full conformance with our rules. From time to time I have questioned whether the signal intensities required by our rules were adequate to give satisfactory service to congested cities and contiguous areas. It is mute testimony that, by special authorizations, two Albany stations are continuing to operate

on their UHF assignments to augment their poor VHF service. While I do not expect the problems to be as severe in either Miami or New Orleans, it is conjectural whether stations operating from these remote locations can effectively compete with more fortunately located stations in the same city.

Bearing on this subject, our staff prepared a memorandum to the Commission dated May 8, 1959, on the matter of "Comparative TV coverage of metropolitan areas in the different frequency bands." I have attached a copy of this memorandum as appendix IV.

The study contained in this memorandum is in part theoretical and in part empirical and ties in with further studies contemplated by TASO.

If I may digress a moment, I should like to add that interference from manmade noise is an ever-increasing problem, particularly as it affects television reception. On July 28, 1958, I submitted to your committee my personal recommendations with respect to proposed legislation which would authorize the Federal Communications Commission to make reasonable regulations setting forth standards pertaining to devices which are capable of causing interference to radio reception. These regulations would be applicable to the use, manufacture, shipment, sale, or offer for sale of such potentially interfering devices. My proposal was to amend section 302 of the Communications Act by the addition of a subsection entitled, "Devices Which Interfere With Radio Reception."

I would be pleased to furnish additional copies upon request.

Returning to our staff's memorandum on the subject of ability of television signals to overcome manmade noise in urban and downtown urban areas, I should like to refer you to tables I and II. The columns of these tables correspond to the columns you have already observed in the Commission's appendix B, however, with subdivisions to differentiate between indoor and outdoor antenna installations.

The columns are designated by numbers which respectively represent the center frequency in megacycles for each of the alternative plans. The columns headed by 69 Mc are for the present VHF band, the columns headed by 195 Mc are for the 25-VHF channel plan, the columns headed by 300 Mc are for the 50-channel plan, and the last columns headed by 650 Mc are for the present UHF band.

You will perhaps be more interested in the results than the computation used. The last line of each table gives the miles to the outer extent of passable service from a transmitting antenna 750 feet in height above average terrain. I emphasize that these are not excellent, not good, but rather grade 3 or passable picture quality. The line immediately above gives such mileages for a 1,250-foot antenna, such as the Empire State Building installation in New York City.

It may or may not be a surprise that the service ranges of television stations are so limited by noise that beyond 4 miles from the Empire State Building an outdoor antenna is necessary to receive a good television service, and that a UHF station could provide a somewhat better service. I would like to mention that under such circumstances the principal limiting factor is man-made noise, and not receiver noise, so that improvements in receivers cannot be expected to assist materially.

I believe that this memorandum will serve to give a better understanding of the problems involved in serving large cities as well as the potential of serving such cities by UHF stations.

In these discussions I have limited my scope to single radiating sources. By that, I mean the licensing of one transmitter to each station.

I should now like to dwell on the potential versatility of the UHF television band as presently constituted. Most, if not all, engineers will agree that the "taboos" presently within our rules relating to the assignment of UHF channels can be substatnially relaxed at the present state of the art. It is these "taboos" which limit the number of UHF channels which can be assigned to a single city to a maximum of about 12.

During a recess in last year's hearings, I informally submitted copies of a published report entitled "A Preliminary Analysis of Multicasting," dated February 4, 1958. I submitted this document for your information and have extra copies for those who may not have them.

Shortly after this report was publicly released, I tried without success to have tests undertaken by the three national networks to test the feasibility of multicasting in New York City. However, it is my understanding that some data taken by CBS on the UHF stations in Albany is now being analyzed by the National Bureau of Standards.[2] This data may shed some light on the practicabilities of this type of an operation.

It is also gratifying that the Adler Electronics Co. has made tests on the feasibility of broadcasting different programs on alternate UHF channels. The preliminary reports of these tests have been submitted to the Commission. It is reported that stations can operate on every other UHF channel in the same city with little or no interference. Accordingly, it is clear that it is technically feasible for 35 UHF stations to operate in a city such as New York. Hence, were multicasting necessary or desirable to render an improved service to congested areas—and I do not concede that it is—such operations would not be seriously hampered by spectrum shortages in the UHF.

Returning to the document entitled, "Preliminary Analysis of Multicasting," it will be observed that two or more UHF stations judiciously and separately placed, and operating on separate channels, are theoretically capable of delivering better and more uniform coverage than a single VHF station operating with a power equal to the combined power of the UHF stations. The UHF is well adapted to the use of such advanced broadcasting techniques as multicasting. It is also well suited, because of receiving antenna dimensions, to another transmitting technique which could give vastly improved service. This technique is called circular polarization.

---

[2] This data has now been analyzed and returned to CBS. No report has been made public by CBS. Our studies of the data indicate that multicasting may result in substantial improvements in service, particularly at low signal levels. It will also be noted that our budgetary request for the fiscal year 1961 contains an item for $2.25 million for research and development and experimental UHF operation including multicasting in a large city. This amount has been specifically approved by the President in his recent budget message and contemplates that the Commission build and operate a UHF television station, on a contract basis, for the taking of data on field strength and picture quality using receivers designed to give optimum performance. It is considered that much useful information with respect to transmitting techniques and designs of antennas and receivers will be forthcoming from such a program.

As you know, the present manner of broadcasting transmission is by the use of horizontally polarized waves. To receive these waves your television receiving antennas are also suspended in a horizontal plane. Dependent upon the angle of incidence of these waves with reflecting objects, the reflected waves may be either perpendicular with, or in the same plane with the transmitted wave. That is, they may be either vertically or horizontally polarized. It is evident then if broadcast stations were to emit both vertically and horizontally polarized waves, which is feasible, and indeed a few FM stations do this, dependent upon the nature of the reflecting objects in the vicinty of the transmitting and receiving antennas, one could obtain good pictures by choosing either a horizontal or vertical receiving antenna configuration, when the antenna is being installed. It is also entirely conceivable that rotating outdoor antennas, as well as indoor ones, could take advantage of greatly enhanced receiving capabilities.

In short, not only could a UHF station be capable of performing with equivalent technical quality in large cities in the present stage of the art of broadcasting, but indeed would be capable of exceeding in technical quality the performance of VHF stations in such areas. This could come about in as much time as it would take the FCC to give, even halfheartedly, some encouragement to such operations by modification of such rules as would permit multicasting and use of circular polarization.

If I may indulge in forecasting the future, I expect that some day, perhaps not in our lifetime, even 70 channels would be unable to embrace coming television needs if we are to adhere to present cochannel spacings. It will be noted in the final paragraph, page 3 of the report on multicasting, which I have submitted, that if the need arises to reduce spacings between stations to accommodate more assignments in the future, that stations employing multicasting could provide equivalent grade A service spaced 50 miles between cochannel stations as single transmitter stations could obtain were cochannel spacings to be 100 miles. From this it is apparent that better service can be provided by multicasting UHF stations at 50-mile cochannel spacings that can be provided by VHF stations at 100-mile spacings. It is evident that approximately four times as many assignments can be made on each channel if spacings were to be halved. That is, four times as many stations can occupy a channel with 50-mile spacings as can occupy a channel with 100-mile spacings. I am not recommending such a reduction in standards but I use this to demonstrate the extreme versatility of UHF.

Thus, it will be observed that with the flexibility that we would obtain with 70 UHF channels it is entirely conceivable that enough spectrum space to take care of broadcasting's every need would be filled for generations to come. I submit that no other of the alternatives even approaches the all-UHF plan in this respect. If I have not already done so, I call attention to the fact that the Commission's so-called ideal 50-channel plan, which I feel reasonably sure is unattainable, would permit but one additional station in the city of New York. While you may feel that eight channels are sufficient for this Greater New York area, I am convinced that future generations will not agree.

I believe that the public deserves better pictures and better sound. There must be adequate research and development of such potentials

as high definition, better color, stereophonic sound, and the many conceivable improvements which would enhance the public enjoyment of television.

Were such techniques to be developed and found marketable it is probable that greater bandwidths of emission may be necessary and that frequency space would have to be available to utilize them. We cannot in the public interest foreclose these vast possibilities by giving up UHF.

ALLOCATION OBJECTIVES—NEW AND OLD

The first objective of the Commission in radio and television allocation has been to make available to all areas of the United States at least one service. The second objective has been to provide each community with at least one station. It is of profound significance that these priorities apparently are to be abandoned.

The Commission's plan, which assumes 50 VHF channels can be obtained for television use, would, as a stated objective—page 7—place five channels—four commercial and one educational—in each of the top 100 television markets. Our studies of the "test area" of the United States indicate that if television stations were to be so concentrated in major markets, vast areas of the populous northeastern quadrant of the United States would be without a grade 3 picture as defined by TASO as "passable." The test area in this case comprised 494,509 square miles of land area. I have attached as appendix V a tabulation showing the degree to which this test area presently receives, or would receive one or more passable pictures and in other columns the degree to which it presently receives, or would receive, five or more passable services.

The top row shows the areas that presently receive VHF service. On the next line is shown the extent of service using shorter spacings to make more service available to large cities. In this case the minimum cochannel spacing is 100 miles. It will be observed that the area with one service decreases from 90 percent to 75 percent, which is the same as saying that the area without a passable service increases from 10 percent to 24 percent. However, it will be noted that the areas which would receive five or more services increase by only 2 percent.

On the next line it will be observed that with 25 VHF channels, the white area would be 22 percent, or more than twice that presently without a passable VHF service, while the area which would receive 5 services would increase to 59 percent. On the next line you will see that with 50 VHF channels—the Commission's "ideal"—the area without a passable television service is 17 percent—nearly double that which presently has no VHF service, while the areas with 5 or more services become a little more than double.

I have added a line to show what could be accomplished with only 50 of the 70 UHF channels in meeting the objective of the Commission to put 5 channels in the top markets. Parenthetically, I want to state here that my only criticism of this objective is that it deals a heavy blow to rural and smalltown populations.

It will be noted that by thus assigning 50 UHF channels some 31 percent of the test area would be without a passable picture—about 3 times as much area as presently deceives no VHF service and not quite twice the Commission's "ideal."

On the last line of the tabulation it will be observed that with 70 UHF channels all of the Commission's objectives, present and past, can be realized. Five or more stations can be assigned to major cities, small and outlying communities can have their own stations, and substantially all areas can be afforded a service.

I wish to emphasize that these figures are based on technical standards which reflect present UHF receiver characteristics, which are on the threshold of dramatic improvement, and the use of present transmitting techniques which I am firmly convinced will experience a similar improvement by some of the methods I have outlined to you.

There have been suggestions lodged with the Commission that an adequate television system could be realized within the present 12 VHF channels if the Commission were to reduce its present minimum cochannel spacing requirements to the point where the outer limit of service of each station were to be dictated by interference from stations rather than by interference from electrical noise. This noise is presently a primary limiting factor commonly referred to as snow.

In layman's terms this is the same as saying that you would be able to get either a passable picture or a degraded picture on each channel instead of pictures on some channels and nothing but snow on the others.

This idea is not new: it was rejected by the Commission in its sixth report and order by the selection of present minimum spacings.

This rejection, however, was predicated upon the expectancy that the use of the 70 UHF channels would be compatible with the use of the 12 VHF channels.

Were the Commission faced with the highly unpleasant alternative of confining television to only a few channels, such as the present 12 VHF channels, I for one would press for a review of the matter of generally and significantly reducing the present minimum mileage requirement.

It is quite apparent that such a narrowing of the television spectrum and packing of stations would result in islands of service amongst seas of interference, new stations would be required to use high towers and transmitting powers in order for their services to be viewed over a range of more than a few miles, and for their operations to be economically feasible.

It is noteworthy that in the low VHF the interference range of a station; that is, the distance to which it is capable of causing interference, extends 100 miles or more beyond the range to which it can render a usable service.

In the UHF interference, signals go out a little farther than the useful service range thereby permitting better service with less interference at closer station spacings. At distances of 130 miles from stations, UHF fields are about 8 decibels below VHF fields. When this factor is coupled with a 5-decibel advantage of UHF receiving antennas the UHF has a 13-decibel cochannel interference rejection advantage.

I have attached as appendix VI a list of cities which are beyond the primary service ranges of the stations which the Commission proposes to be assigned to the top 100 markets. These cities and many others are virtually forgotten by the Commission. It is my belief that there is a reasonable expectancy that stations might profitably

operate in many such communities. The cities listed are given with their 1950 census populations, with notations as to whether there are presently authorized AM radio stations located therein and with the television channels which are presently assigned thereto.

I want it thoroughly understood that this list is a sampling of a portion of the United States for demonstration purposes. The maximum number of channels available is not intended to be representative nor does the list purport to include some cities to the exclusion of others from whence the demand for spectrum space may soon be heard. I thought this explanation pertinent should you find your hometowns to be unlisted.

It will be further noted that a small percentage of the cities listed have no channel presently assigned. This stems from the fact that at the time of the sixth report and order no standard broadcast station operated in these cities and the need for a specific channel assignment did not appear necessary or appropriate. I can assure you that it is entirely feasible to assign UHF channels to these cities.

Several of the cities, such as Bowling Green, Ky.; Iron Mountain and Ironwood, Mich.; and Beckley, W. Va., currently have VHF assignments with outstanding authorizations or applications therefor.[3] These cities and many others in the United States are not within the top 100 markets and, accordingly, are not slated for 5 VHF channels nor, for that matter, any VHF channel. To the extent that the Commission may hesitate to remove these assignments its "objectives" would be frustrated. Moreover, there are many cities with UHF stations that do not find themselves on the preferred list. Hence, the Commission, in allocating its precious VHF spectrum, would be faced with the unpleasant choice of leaving these cities out in the cold or departing rather substantially from its objectives.

On the other hand, an all-UHF system has none of these shortcomings. With alternate-channel operation, which I have described, New York City or any other city could be assigned 35 UHF channels instead of 7 or 8 VHF channels and there would be sufficient channels for smaller and remote communities.

You may be prompted to ask whether it is economically feasible to operate 35 stations in New York or to operate even 1 station in any of the small communities such as I have listed. I can only answer that only time will tell. Certainly I would not act to forever preclude these possibilities by trading away the UHF spectrum.

RECEIVER COSTS

The Commission's statement treats the matter of increased receiver cost for all-channel VHF-UHF receivers to obtain the bands presently allocated to television. One significant matter which the statement failed to set forth in its discussion of a 70-channel UHF system is the comparable costs of all-UHF receivers and all-VHF (12 channel) receivers.

We have obtained written statements on these estimated costs from two representative receiver manufacturers. RCA estimates that an all-UHF receiver, using what it calls its pencil tube, would retail in

[3] Bowling Green, Ky., applied for; Iron Mountain, Mich., applied for; Ironwood, Mich., CP in Wakefield, Mich.; Beckley, W. Va., licensed in Oak Hill, W. Va.

the neighborhood of $11.50 more than its standard 21-inch VHF receivers which currently list for around $200. GE states that an all-UHF receiver, using its ceramic tube, could be expected to cost from $4 to $6 more than current receivers to manufacture.

My attention was called to an advertisement in the June 1959 issue of Electronics World wherein a manufacturer offers to replace the tuners of television sets at the following prices:

VHF (12 position)	$22.00
VHF (13 or 16 position)	23.00
VHF/UHF (combination)	25.00
UHF (only)	15.50

I offer these figures without comment. Whatever the receiver cost, I am firmly convinced that an all-UHF system is cheaper and better than a 25- or 50-channel VHF system for with such VHF systems the public must buy new receivers, the broadcaster must buy new transmitting equipment and the military must buy both. The bill to the military alone is estimated to be in the multimillions which the public supports by taxes. Even if you don't give a hang for television and wouldn't have a receiver in the house, you are to be forced to ante up.

BOOSTERS AND TRANSLATORS

I think it is important to consider for the moment the impact of the Commission's decision to abandon the UHF upon small communities outside the service ranges of VHF stations.

To a significant extent, the people so located are receiving service from UHF translators which are authorized to operate on channels 70 through 83. The rules governing UHF translator operation became effective in July 1956. Since that time the Commission has authorized 236 translators in almost as many communities. Some communities have more than one translator. As of May 31, 1959, we had an additional 37 applications for construction permits for translator stations. Applications are being filed and processed for these stations at the rate of about 20 per month.

These translators serve from 250 receivers to several thousand. As a fair average, about 2,000 receivers are served by each translator. Considering that the average receiver is viewed by perhaps four persons in a typical household and, using some rough arithmetic, I calculate these to be about 2 million potential viewers in the service range of UHF translator stations. Granting 20 new translators per month would approximately double this number in a year's time.[4]

It goes without saying that if the UHF is either abandoned or if translator or UHF receiver manufacturer and use are significantly discouraged by overt acts of the Commission, many people will lose forever their only opportunity to receive television service. I say this because I confidently believe that the VHF spectrum space could not be expected to sustain such operations as these and the many cur-

[4] There are presently 300 UHF translators authorized. The filing rate has now dropped to about four per month. Consequently, by next July it is not expected that the number of UHF translators will have doubled, principally because the Commission is presently reconsidering the licensing of VHF translators and prospective applicants are known to be awaiting the outcome of the proceeding. However, applying the same type of arithmetic, there are presently about 2.5 million UHF translator viewers.

rently unlicensed boosters which now satiate the public demand for television programs.

SPECTRUM UTILIZATION

I have not proposed to my fellow Commissioners a move to an all-UHF system without having some fairly definite ideas as to the possible uses of the 12–VHF channels currently allocated to broadcasting.

I thoroughly recognize that the Commission is presently conducting an investigation of the possible use of all of the frequency space between 25 and 890 mc. and that my views could be tempered by the evidence adduced therein. However, as a companion rule making matter to a proposal to terminate VHF broadcasting, I would issue proposed rulemaking looking toward the nonbroadcast use of these channels to expand spectrum space allotted to fixed and mobile services. In addition to the release of 72 megacyles currently occupied by television, the prospect of the use of the space between 72 and 76 mc. becomes apparent. The use of this space has heretofore been restricted because of the operation of television stations on channels 4 and 5 on either side of this band.

The Bell Telephone System has been urging during the past 10 years for a broad band allocation of frequencies to consolidate its mobile operations. It is generally conceded that there will be no adequate availability of frequencies for land and aeronautical mobile services unless such a technique is adopted.

Our staff has advised me that in the neighborhood of 30 to 40 mc. of space between 174 and 216 mc. would meet the entire common carrier communications needs for the foreseeable future.

It will be noted that 30 megacycles of space at 200 mc. is roughly equivalent to 75 mc. of space at 800 mc. This is because at lower frequencies the same number of voice channels can be accommodated in one-half the spectrum space. I think it is quite evident that this constitutes a more efficient utilization of spectrum space. On the other hand, a single television channel takes 6 megacycles of space wherever it is placed—in UHF or VHF. I mentioned 75 megacycles of space in the neighborhood of 800 mc. because the Bell System has requested the reallocation of 765 to 840 mc., UHF television channels 63 through 75, for common carrier communications use.

I have also considered the needs of the safety and special radio services. These licensees include, or perhaps I should say they would include, fire and police departments, hospitals, physicians, forest conservation authorities, highway maintenance and highway safety authorities, local governments, motor carriers, aviation terminals, railroads, taxicab companies, and a variety of manufacturing industries, businesses, and private citizens with radio needs.

Just as an example of how these needs could be met if television were moved to UHF, I have attached to my statement a tentative allocation [5] of this spectrum space and have marked this exhibit appendix VII.

While I have made no firm proposal to my fellow Commissioners in this regard, I have urged that a rulemaking proceeding looking toward the removal of broadcasting from the VHF should be accom-

[5] I do not intend to exclude consideration of additional frequencies for FM broadcasting to accommodate increased needs currently indicated.

panied by a rulemaking proceeding looking toward an efficient and equitable utilization of this spectrum space. I offer this exhibit merely as an illustration of the manner in which these channels could be effectively utilized by the nonbroadcast services.

I submit that with full and proper utilization of the UHF by the broadcast industry and the transfer of communications common carriers and the fixed mobile stations eligible for licensing in the safety and special services to the space occupied by television channels 2 through 13 would result in enough spectrum space for these operations for the next 20 or possibly 30 years.

I should like to draw your attention to the fact that this plan for spectrum utilization is perfectly compatible with both present and proposed international agreements, which currently permit fixed, mobile, and broadcasting uses in channels 2 through 13. You will also note that the Commission's plan for additional VHF channels for television use will require amendments to international treaties in addition to the amendment of its own rules.

These allocations matters cannot await an interminable period for solution. The industries in this country and its private citizens deserve a speedy and equitable solution. We of the Commission can ill afford to let many more years roll by without providing for the basic spectrum needs of our industries and our people. I stand firmly for clearing these matters aside so that we can get on with our licensing functions. However, letting the UHF remain fallow while industry needs are cramped into highly limited spectrum space is not conducive to our national defense interests, which are so firmly interwoven with our industrial development.

HOW TO GET TO AN ALL-UHF SYSTEM

There are several alternative methods of direct action which are available to the Commission to arrive at an all-UHF system. I can outline three of these alternatives. There perhaps are others.

(1) We could get to an all-UHF system by the attrition of the VHF band for broadcast use. By not granting any more applications for new or increased VHF facilities and by requiring, presuming the legislative authority were to be conferred upon the Commission, that all receivers entering interstate commerce were capable of receiving all channels. Slowly but surely, if the Commission were to hold this line, it could be expected that those licensees interested in new or improved facilities would exploit the UHF. This method is filled with a few "ifs" and would require an unwavering Commission attitude.

(2) We could issue orders to show cause why VHF licenses should not be modified and grant hearings when requested as required by section 316 of the Communications Act.

(3) We could condition the grant of each renewal of VHF license upon the simultaneous operation of a UHF facility. The succeeding renewal could be conditioned upon a gradual diminution of VHF operating hours until the operation became entirely UHF. This course of action would require the waiver of the Commission's multiple ownership rules.

However, I believe it rather premature to plan the means of obtaining an all-UHF system until my fellow Commissioners become as convinced as I that the public interest would be served thereby.

THE ECONOMY OF SCARCITY

We have spent many Government and industry man-hours in investigating network practices. Certain new rules and perhaps changes in the Communications Act may flow from our studies. I submit, and several network executives agree, that the artificial limit on the number of stations which can effectively compete for network affiliation and for the advertisers' dollars is the fundamental cause of the problems arising in network and station relations that prompted the Congress to appropriate thousands of dollars for a Commission network study.

There is a clear, basic and urgent need for a truly competitive television system for this country. I submit that the Commission's long-range and interim plans give little promise of meeting these vital needs.

The economy of artificial scarcity of stations has resulted in disproportionate monetary valuations being attached to station licenses wherein only the very rich can compete. This condition is amply illustrated by examining the large station transfers of the past few years where the Commission's comparative hearing processes are completely frustrated. A long, costly hearing to determine the best of competing applicants results in a grant to one who, after a "decent interval" sells it to another for a large capital gain, who quite probably could not have won it on his own merit in a comparative proceeding.

Television in a decade has revolutionized our way of life and our prospects for the future. A few years ago we were shocked by the progress being made by Soviet Russia. Television holds a hope for low-cost mass education. It can assist in the classroom and raise the level of teaching, the standards of education and the intellectual advancement of our children, as well as providing a much needed medium of adult education. However, for how long could we expect that educational institutions would be able to pay the hourly rate exacted for commercial time in prime evening hours in our present rising economy?

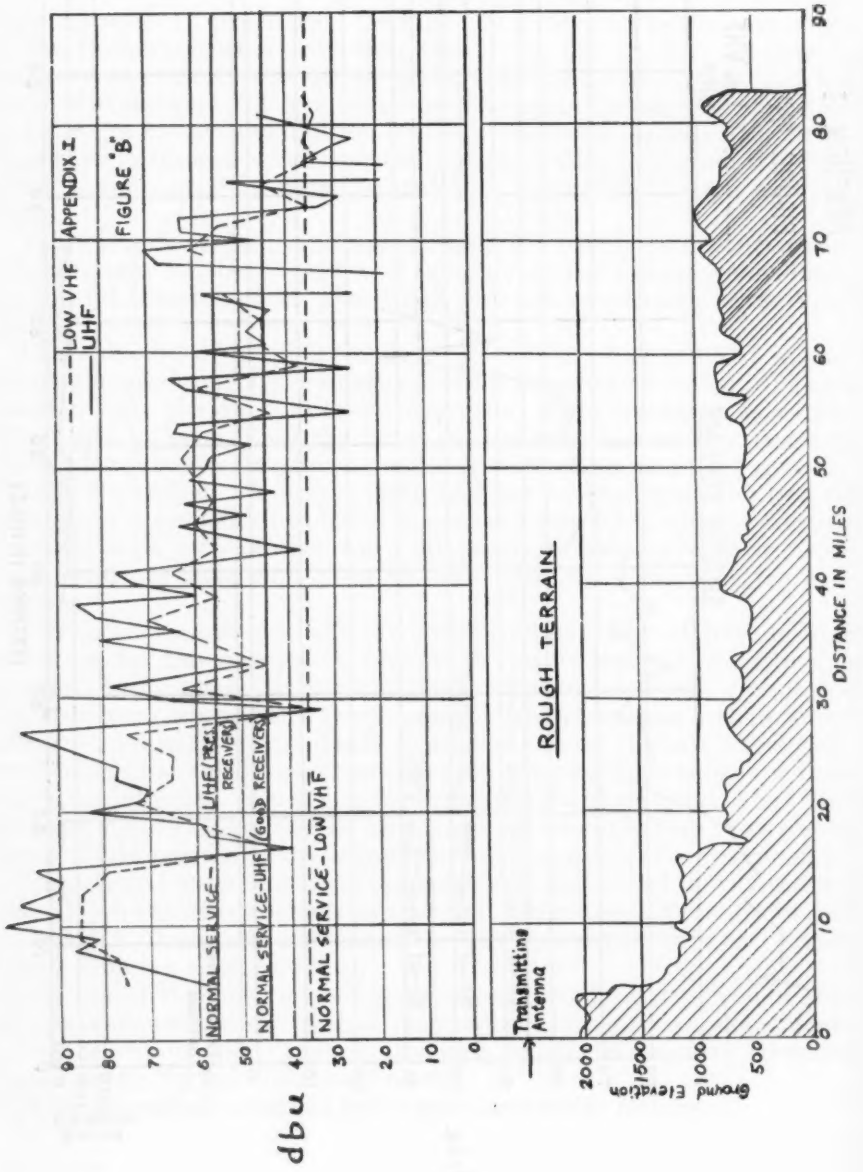
Educational broadcasting is only on the threshold of its vast potential. With two-thirds of our educational assignments virtually locked in the UHF, it seems to me that if for only this reason bold and immediate action is a vital necessity.

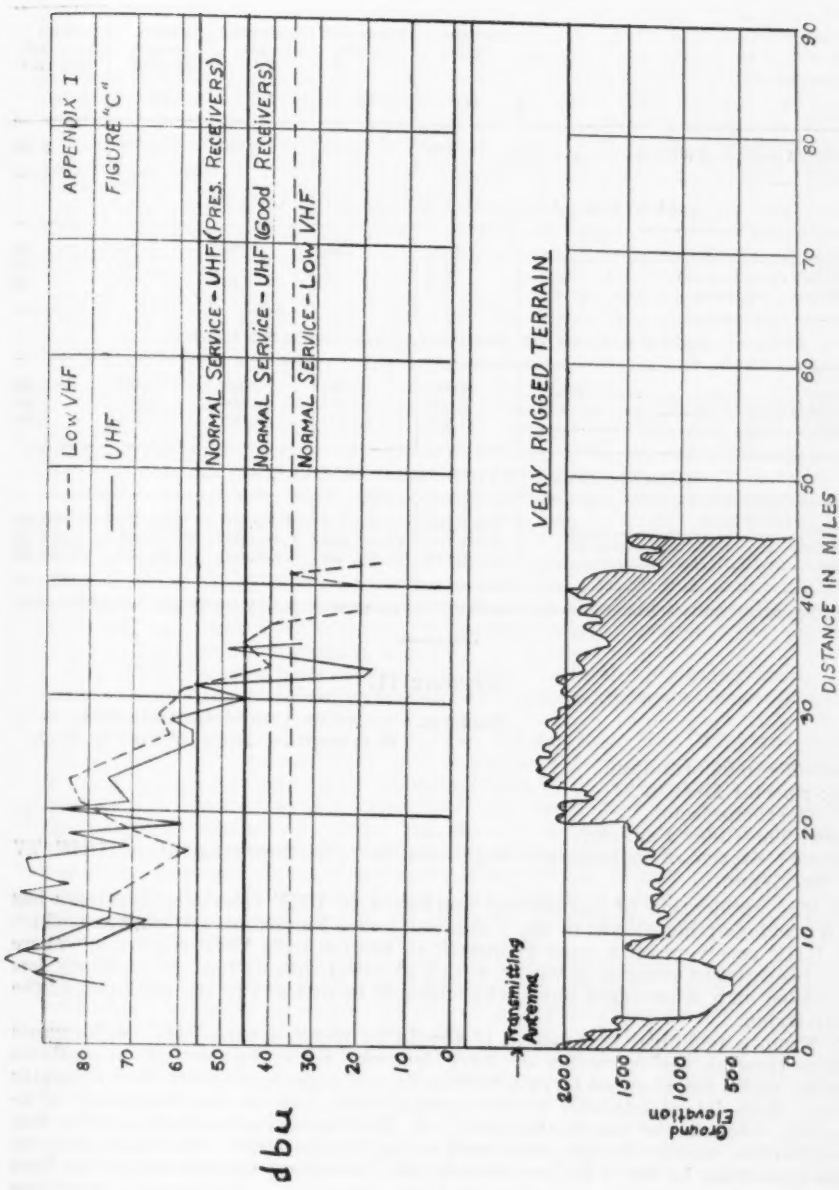
The city of Washington and many others have been deprived of educational stations because of the Commission's present assignment plan. I, for one, cannot await the tedious steps which the majority proposes to answer the Nation's television needs.

(The appendixes attached to the statement are as follows:)

APPENDIX I

FIGURE "A"


APPENDIX I
FIGURE "B"
---LOW VHF
——UHF
dbu
NORMAL SERVICE - UHF (PRES. RECEIVERS)
NORMAL SERVICE - UHF (GOOD RECEIVERS)
NORMAL SERVICE - LOW VHF
ROUGH TERRAIN
Transmitting Antenna
Ground Elevation
DISTANCE IN MILES


APPENDIX I
FIGURE "C"
---- Low VHF
—— UHF
NORMAL SERVICE - UHF (PRES. RECEIVERS)
NORMAL SERVICE - UHF (GOOD RECEIVERS)
NORMAL SERVICE - LOW VHF
VERY RUGGED TERRAIN
Transmitting Antenna
dbu
80
70
60
50
40
30
20
10
0
2000
1500
1000
500
0
Ground Elevation
0
10
20
30
40
50
60
70
80
90
DISTANCE IN MILES

APPENDIX II

Comparison of service capabilities of the television systems under consideration (assuming present spacings)

	12-channel system (a)	25-channel system (b)	50-channel system (c)	70-channel system	
				With present receivers (d)	With improved receivers [1] (e)
Maximum number of stations	600	1,250	2,500	3,500	3,500
SERVICE RADIUS OF EACH STATION (MILES)					
Primary	38.5	38	33	26	32
Secondary	54.0	58	51	40	48
Fringe	65.0	69	67	48	55
SERVICE AREA OF EACH STATION (SQUARE MILES)					
Primary	4,650	4,500	3,350	2,100	3,200
Secondary	9,200	10,000	8,000	5,000	7,200
Fringe	13,200	15,000	14,000	7,100	9,500
CUMULATIVE SERVICE AREAS (SQUARE MILES)					
Primary	2,800,000	5,600,000	8,400,000	7,300,000	11,200,000
Secondary	5,520,000	12,500,000	20,000,000	17,500,000	25,200,000
Fringe	8,000,000	18,750,000	35,000,000	25,000,000	33,500,000

[1] Using such as parametric amplifiers which are currently being developed by more than 50 manufacturers.

APPENDIX III

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., March 6, 1959.

Interoffice memorandum.
For: Special Meeting.**
To: The Commission.
From: The Chief Engineer.
Subject: Status of parametric amplifiers for the improvement of UHF TV receivers.

1. The application of parametric amplifiers to UHF television receivers has been previously mentioned to the Commission as a long-range development which put UHF receivers on a more comparative footing with VHF receivers. There have been recent reports, however, which give indications that development has proceeded on a more rapid basis which should be brought to the attention of the Commission.

2. From a technical standpoint, it should be recalled that UHF performance suffers through the operation of three factors. First, for equivalent radiated powers, while for average terrain within line of sight equivalent field strengths result, there is considerably greater propagation loss as the frequency is increased. Second, the practicable forms of UHF receiving antennas deliver less power to the receiver for the same field strength as at VHF. Third, the internal noise generated by the UHF receiver which the signal must override has been greater on commercially practicable UHF receivers. Parametric amplifiers give promise of substantially reducing the disparity of UHF receivers. Parametric amplifiers might also be applied to VHF receivers, but less advantageously because cochannel interference and galactic noise will limit the performance of VHF receivers except in special cases.

3. Parametric amplifiers are known by various trade designations such as "Mavar" and "Varactor" devices. They should be distinguished from Masers which employ a different principle of operation and do not hold much promise for UHF TV receivers. Parametric amplifiers employ special solid state diodes, not dissimilar to the so-called "crystal" detectors used in present UHF and radar receivers. While diodes in their conventional application function as variable resistance devices, in the parametric amplifiers they are caused to function as variable reactance devices with the shunt resistance kept as high as possible. Special diodes are made to operate as amplifiers and converters by the introduction of a "pumping" signal with the result that the reactance of the diode varies in accordance with the "pump" signal. The "pump" frequency may be either higher or lower than the signal frequency. Circuity of a type not now used in broadcast receivers is required. Since reactance generates no noise, parametric amplifiers have a very low noise figure, approaching 0 decibel, as compared with 13 to 15 decibels for present commercial UHF techniques and 9 decibels anticipated with improved tubes.

4. While parametric amplifiers have been reported upon in the technical literature for some time, the first experimental application to UHF TV reception was made by Microwave Associates, Inc., of Burlington. Mass. Mr. Arthur Uhlir of that firm obtained reception at a distance of 100 miles from WCHC on channel 19 at Burlington, Mass., according to the report contained in Television Digest for February 28, 1959. However, Mr. Uhlir in a letter to the Chief Engineer dated March 3, 1959, reported that the reception was obtained at Medfield, Mass., from the Mount Greylock transmitter having an effective height of approximately 1,800 feet. Mr. Uhlir reported as follows:

"The antenna used was on a tower but was tuned for the 432-megacycle amateur band, rather than the 496-megacycle channel 19. The low noise UHF amplifier was one which we now sell commercially. We also sell 'Varactor' diodes for amplifier use.

"There is no doubt that Varactor amplifiers can become cheap enough for home television receivers; it is conceivable that they will eventually lead to cost reductions compared to present receivers, through elimination of parts.

"The low-noise properties of UHF Varactor amplifiers will affect other possible uses for these frequencies, but possibly not as dramatically as in UHF television which for cost reasons could not make use of the best available devices. You will no doubt have considerable information to evaluate the significance of a 1 to 2 decibel receiver noise figure."

The pump frequency used was 1,700 megacycles in this experiment.

The letter also included technical data on the equipment manufactured by Microwave Associates.

5. In order to obtain more definitive information, Mr. Uhlir was called on the phone. He reported that the reception reported was obtained with the MA–1 C parametric amplifier manufactured by his firm which was a tuning range from 350 to 500 Mc. This unit sells for $1,250 which does not include the pumping oscillator circuit. The diode has been reported as costing about $50. Approximately 2,000 of these units have been sold for special applications but the unit has not yet been incorporated in any production military equipment. Mr. Uhlir guessed that the amplifier might be made for $12.50 if it could be produced in lots of 100,000. This figure does not include pump circuit nor the markup by the set manufacturer.

6. Mr. Uhlir reported that his firm had under development an amplifier which would cover the entire VHF and UHF range in one unit. He suggested that the cost of the pumping oscillator circuit could be minimized by the use of transistors and Varactors but no cost was given. The cost of the rest of the receiver, through the elimination of some of the intermediate frequency stages, might be reduced somewhat. As to the time factor these units might be available for home receivers in about 3 years. He expected that "Cadillac" style UHF converter might be on the market in about a year. It should be noted that Microwave Associates is not in the home broadcast receiver business, although Mr. Uhlir appears to be one of the authorities in the field of high frequency solid state devices.

7. As to cost, it was pointed out that there is nothing inherently expensive in the device which might not be reduced by mass production. The diode itself is not fundamentally dissimilar to solid state diodes and transistors which now retail for a dollar or two. Ross Bateman and Walter F. Bain in the March 1959 issue of QST described the construction of a "junk box" reactance amplifier

described as follows: "It consists of not much more than a 3 by 4 by 17-inch aluminum box, two pieces of copper strap, a diode, and many man-hours of fiddling." He reported that there was no discernible difference in the noise figures obtained with a precision amplifier.

8. In connection with the time scale, it should be noted that UHF military equipment has been produced having a noise figure of 6 db for many years, and laboratory equipment in a state of development comparable with the parametric amplifier for more than 10 years. The key to availability in home equipment is in the willingness of the manufacturers to invest in final development and production engineering and purchase of tools which in turn depends on the market anticipated by the manufacturers. Depending on the Commission action and the support of the industry in constructing stations, a time scale of from 5 to 10 years should be considered on the basis of past experience with comparable developments.

9. It should be mentioned that this information is that secured from published literature and only one manufacturer. It is reported that there are over 50 firms engaged in this type of development. It is possible that others have made more progress and for competitive reasons are not divulging their results. There are reports that Zenith is working in this field but no response has been received to a letter of inquiry. It should be noted that TASO, while the possibilities of parametric amplifiers is mentioned in the panel reports, has not included the parametric amplifier in its estimates of the services potential of UHF.

10. It may be of interest to show the results of computation of the UHF and high VHF service areas using the same assumptions contained in the summary memorandum from the Chief, Broadcast Bureau, and the Chief Engineer, except that a 2 db noise figure is assumed. The respective service ranges are:

[In miles]

	UHF (with parametric amplifier)	UHF	High VHF
Primary	32	26	38
Secondary	48	40	58
Fringe	55	48	72

In addition, the service within these limits will be substantially improved with the parametric amplifier.

11. From the limited information at hand, it would seem that an optimistic figure for the technical availability of parametric amplifiers would be 3 years. A more conservative estimate would probably be 5 years or more. This does not allow for "breakthroughs" by other manufacturers, but experience has shown that the application of new developments to mass production is limited by the investment spent on the final development which is dependent on a ready market. However, the lower potential cost and the substantial improvement in performance may accelerate commercial development.

E. W. ALLEN, *Chief Engineer.*

APPENDIX IV

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., May 8, 1959.

Interoffice memorandum.
For: Information (TV allocations).
To: The Commission.
From: Chief Engineer.
Subject: Comparative TV coverage of metropolitan areas in the different frequency bands.

For some time now questions have been raised as to whether or not a UHF TV station could serve adequately a heavily built-up metropolitan area. Since there are no actual service measurements available of this type, a paper study is made

in this memo, combining the various factors which affect service to arrive at some figures by which the TV service at the various frequencies may be compared. The study indicates that the higher frequencies, including UHF should be able to service a heavily built-up metropolitan area, such as New York City, as adequately as the lower VHF frequencies.

Table A has been recently compiled by the staff for the purpose of comparing rural coverage at the various frequencies. It has already been distributed and is reproduced here only for convenience.

Table I is a summary of the factors pertaining to urban service for a grade 3 (passable) picture. The various factors are explained briefly in the appendix. Calculations are made both for indoor and outdoor antenna installations. Such service should be appropriate for covering a metropolitan area other than the downtown and industrial areas. The 1250-foot transmitting antenna height corresponds to an Empire State Building installation and the 750-foot height is the present average. It is noted that UHF should provide slightly better service than low VHF for indoor receiving antenna installations. For outdoor installations the low VHF should be a shade better. The high VHF indicates a slightly better service than either the low VHF or UHF.

Table II summarizes the factors pertaining to a downtown urban service with a grade 3 picture. This grade of service should be appropriate for the downtown and industrial areas. Again there is little to choose from among the various frequencies.

The above studies presented as tables I and II do not consider sever l factors which may be important to a metropolitan service. First, the problem of ghosting is not treated since there is no quantitative data available. However, qualitative reports indicate that ghosting is a serious problem in large built-up areas. Also, these reports indicate that because of the greater directivity of receiving antennas the UHF may be superior to the lower frequencies in this respect. Another factor which may offer appreciable advantages, is the technique of multicasting the same program at several frequencies and at different locations to obtain a combined frequency and space diversity. Multicasting is practical only on UHF. Further, circular polarization should offer appreciable advantages in that it would not only provide substantially more receiving locations of good signal to noise ratios by virtue of the inherent polarization diversity (see reference 7) but would also offer discrimination against both multipath ghosts and interference from other stations. The details of circular polarization discrimination will be described in a future T.R.R. report from the Office of the Chief Engineer. Circular polarization is also practical mostly at UHF because of the physical size limitations of receiving antennas.

From this pilot study it appears therefore that a TV station on any of the VHF or UHF frequencies should be able to serve the large metropolitan areas about equally well. From table A it is obvious that the lower frequencies are superior for rural coverage.

E. W. ALLEN.

REFERENCES

1. Reference Data for Radio Engineers, 4th edition by International Telephone & Telegraph Corp.

2. Comparison of Mobile Radio Transmission at 150, 450, 900, and 3,700 Megacyles by W. Rae Young, Jr.

3. Radio Transmission Into Buildings at 35 Megacycles and 150 Megacycles by L. P. Rice, BSTJ, January 1959.

4. Comparative Propagation Measurements: Television Transmitters at 67.25, 288, 510, and 910 Megacycles by G. H. Brown, J. Epstein, and D. W. Peterson. RCA Review, June 1948.

5. Ground Wave Field Strength Surveys at 100 and 600 Megacycles by J. A. Saxton and B. N. Harden, I.E.E., July 1954.

6. Propagation Data and Service Calculation Procedures Used for the Recended Appendix A of Report and Order (Docket No. 11532), released June 26, 1956, by H. Fine and J. Taff, FCC Report, T.R.R. 2.4.16.

7. Circular Polarization in FM Broadcasting by Carl E. Smith. Electronics, September 1948.

Appendix

Description and Comments on Various Factors in Tables I and II

SIGNAL REQUIRED TO OVERRIDE NOISE

(a) Urban numbers were derived from reference 1 (p. 763) by correcting for bandwith and adding a 14 db signal-to-noise allowance. The 14 db was assumed on the basis that the quasi-peak noise values from reference 1 would cause objectionable interference when they exceed 20 percent of the peak video level.

(b) Downtown urban noise was assumed to be 15 db greater than suburban noise as shown in reference 2. However, the suburban noise values of reference 1 were used as the base, since this reference is more recent than reference 2 in which the values given (after correction for bandwidth, etc.) are about 3 db lower. It is probable that present day noise consists of a larger percentage of neon light and appliance noise as well as less auto ignition noise than when the measurements of reference 1 were made; in which case, UHF would suffer relatively less than VHF from manmade noise, but no quantitative data is available on these trends.

ANTENNA LOSSES

The antenna losses shown in the receiving antenna loss row are for reasonably good installations. The outdoor antenna gains are the same as used in table A for the secondary service column and represent TASO values. However, qualitative reports and measurements in reference 4 indicate that the full gain from a receiving antenna is not realized in weak signal areas where the signal is scrambled and arriving from several different directions simultaneously. This loss factor would probably be more serious at the higher frequencies, in the more built-up areas, and indoors. It is believed that the areas affected most would probably be those where the signal was too weak to supply a satisfactory service. However, to compensate for this apparent loss in gain of the receiving antenna, only two-thirds of the outdoor antenna gain and one-half of the indoor antenna gain, when the free space gain is greater than that of the dipole, has been assumed in the operating receiver antenna loss row. Multicasting should alleviate some of this loss since there would be more probability of a coherent signal arriving at the receiving antenna. A more careful search for a location with a coherently arriving signal would also be helpful.

AVERAGE BUILDING LOSS

These losses were derived from reference 3 and represent the ratio of the signal inside the building to the average value of the signal in the streets at that distance. The full downtown New York City loss for a 6-foot receiving antenna height was used for urban downtown (table II) and one-half this decibel loss was assumed for the urban (table I) service. These values are believed to be on the conservative side for antennas higher than 6 feet, such as used by most people.

LOCATION AND BUILDING VARIATION FACTOR

This factor represents the correction for the variation in signal strength from location to location. It is the added signal strength required to provide service to 70 percent of the locations rather than 50 percent. For outdoor installations the values in table A were used. For indoor installations a value of 7 db was assumed based on reference 3. The 7 db represents the combined variation from location to location inside the building and from building to building. The location factor increases with frequency whereas the building factor decreases with frequency. This factor may be slightly conservative for the urban study (table I).

MEDIAN FIELD STRENGTH REQUIRED

This row represents the F (50, 90) signal strength level required to provide a grade 3 picture to 70 percent of the locations. It is obtained by summing the various factors in the preceding lines.

EQUIVALENT FIELD STRENGTH

By adding the depression factor (in db) to the median field strength required an equivalent field strength is derived which represents the rural field strength at comparable distances, which values may be used in conjunction with the field strength versus distance curves to compute the service ranges.

DEPRESSION FACTOR

It is known that the signal in a built-up area is lower than it would be in a similar rural area. Note that this is a reduction below average rural signal strength values and not below smooth earth values. The numbers selected are conservative and probably favor the lower frequencies.

DISTANCE TO SERVICE LIMITATION

These values were obtained from the appendix A (reference 6) 90 percent curves for a 1,250-foot transmitting antenna height. The 300 mc. values were interpolated.

Table A

TV PLANNING PARAMETERS

(Revised 5-14-59)

Item																
1. Height above Average Terrain	750 feet															
2. Frequency Band	54 - 88 Mc (5 channels)			174- 324 Mc (25 channels)			174-474 Mc (50 channels)			470-890 Mc (70 channels)						
3. Geometric Mean Frequency	69 Mc			240 Mc			290 Mc			650 Mc)						
4. Power (ERP)	20 dbk(100 kw)			25 dbk(316kw)			27 dbk(500 kw)			30 dbk(1000kw)						
5. Picture Quality	Gr2	Gr3	Gr4	Gr2	Gr3	Gr4	Gr2	Gr3	Gr4	Gr2	Gr3	Gr4				
6. Service Grade	Pri	Sec	Fri	Pri	Sec	Fri	Pri	Sec	Fri	Pri	Sec	Fri				
7. Thermal Noise (dbu @ 300 ohms)	7	7	6	7	7	6	7	7	6	7	7	6				
8. Receiver Noise Figure (db)	7	6	5	10	8	6	11	8	7	12	10	9				
9. Required Vis. Peak Noise ratio (db)	36	27	23	36	27	23	36	27	23	36	27	23				
10. Transmission Line Loss (db)	2	2	2	3	3	3	4	4	4	5	5	5				
11. Receiving Ant. Loss (db)	-3	-4	-7	-3	-5	-10	-5	-7	-12	-8	-10	-14				
12. Dipole Factor (db) (-20Log96.5/fmc)	-3	-3	-3	8	8	8	10	10	10	17	17	17				
13. Location Probability (L)	70%	50%	50%	70%	50%	50%	70%	50%	50%	70%	50%	50%				
14. Req. Local Field F(L,90) (dbu)	46	35	26	61	48	36	63	50	38	69	56	46				
15. Loc. Probability Factor R(L) (dbu)	3	0	0	4	0	0	5	0	0	6	0	0				
16. Req. Median Field F(50,90) (db)	49	35	26	65	48	36	68	50	38	75	56	46				
17. Service Range (mi) (Noise Limited)	50	74	110	38	53	72	33	51	67	26	40	48				
18. Co-channel S/I Ratio (db)	36	27	20	36	27	20	36	27	20	36	27	20				
19. Adj. Channel S/I Ratio (db)	-22	-27	-31	-22	-27	-31	-22	-27	-31	-22	-27	-31				
20. Rec. ant. front/back ratio (db)	3	4	7	3	5	10	5	7	12	8	10	14				
21. Dist. to co-ch lim (mi)(S=215 mi)	38.5	54	65	38	57	69	33	51	67	26	40	48				
22. Dist. to adj-ch lim (mi) (S=100 mi)	50	63	74	38	53	72	33	51	67	26	40	48				

TABLE I
URBAN TV SERVICE
(Grade 3 Picture)

Frequency in Mc	69		195		300		650	
Power in DBK (Kw)	20 (100)		25 (316)		27 (500)		30 (1000)	
Quasi-peak noise field relative to X/2 dipole Dbu	49		46		45		43	
Signal to peak noise ratio required for Grade 3 picture Db	14		14		14		14	
Signal required to override urban noise and set noise relative to X/2 dipole Dbu	63		60		59		61 (Set noise limitation with rec. (noise fig. 1)	
Receiving antenna location	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
Rec. antenna loss referred to X/2 dipole Db	3	-4	1	-5	-1	-7	-3	-10
Operating rec. antenna loss referred to X/2 dipole Db	3	-3	1	-3.5	-.5	-4.5	-1.5	-6.5
Average building loss Db	11.5	0	11	0	10.5	0	10	0
Location & building factor for service to 70% of location Db	7	3	7	4	7	5	7	6
Median field strength required for service F(50,90) Dbu	84.5	63	79	60.5	76	59.5	76.5	60.5
Urban depression loss Db	3	3	9	9	11.5	11.5	15	15
Equivalent field strength level to be used with Appendix A curves in Dbu	87.5	66	88	69.5	87.5	71	91.5	75.5
Distance to service limitation (h_t= 1250' h_r= 30') Miles	14	37	23	44	22	40	18	34
Distance to service limitation (h_t= 750' h_r= 30') Miles	11	29	16	33	16	30	14	25

TABLE II

URBAN DOWNTOWN TV SERVICE

(Grade 3 Picture)

Frequency in Mc	69		195		300		650	
Power in Dbk (kw)	20(100)		25(316)		27 (500)		30 (1000)	
Quasi-peak noise field strength relative to X/2 dipole in Dbu	58		57.5		57.5		57	
Signal to peak noise ratio for Grade 3 picture in Db	14		14		14		14	
Signal required to override urban downtown and set noise Db	72		71.5		71.5		71	
Receiving antenna location	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor	Indoor	Outdoor
Rec. antenna loss referred to X/2 dipole Db	3	-4	1	-5	-1	-7	-3	-10
Operating rec. antenna loss referred to X/2 dipole Db	3	-3	1	-3.5	-.5	-4.5	-1.5	- 6.5
Average building loss Db	23	0	22	0	21	0	20	0
Location & building factor for service to 70% of locations Db	7	3	7	4	7	5	7	6
Median Field strength required for service F(50,90) Dbu	105	72	101.5	72	99	72	96.5	70.5
Downtown urban depression loss in Db	6	6	12.5	12.5	15	15	20	20
Equivalent field strength level to be used with Appendix A curves in Dbu	111	78	114	84.5	114	87	116.5	90.5
Distance to service limitations (h_t= 1250' h_r= 30') Miles	4.0	24	4.5	27	4.5	27	4.5	19
Distance to service limitation (h_t= 750' h_r=30') Miles	3.0	18	3.5	19	4.0	19	3.5	17

APPENDIX V

AN ANALYSIS OF THE COVERAGE CAPABILITIES OF THE SEVERAL ALTERNATIVE PLANS

The following is a tabulation of the present and potential television coverage of the northeastern quadrant of the United States, which sector has been chosen as a test area because it presents the most difficult allocation problems. The area comprises 494,509 square miles of land area. The grade of service considered is "passable" or better as defined by TASO.

Service from various plans	1 or more (square miles)	Percent served	Percent unserved	5 or more (square miles)	Percent
Existing VHF	444,342	90	10	140,169	28
12-channel VHF with 100 mile minimum spacings	375,003	76	24	189,503	30
25-channel VHF	385,007	78	22	291,672	59
50-channel UHF–VHF	412,508	83	17	307,172	62
UHF using 50 channels [1]	348,673	71	29	201,504	41
UHF using 70 channels [1]	485,000	98	2		

[1] The UHF estimates are based upon present UHF receivers and transmitting methods. The areas which would receive 5 or more UHF services are difficult to estimate. They would be dictated more by economic considerations than by technical passability.

APPENDIX VI

EXTRA UHF CITIES FOR 1 CHANNEL PROVIDING SERVICE TO AREAS BEYOND A PRIMARY SERVICE

State and city	Population	Channels presently assigned	AM station
Connecticut: Torrington	27,820	None	Yes.
Delaware: Dover	6,233	40	Yes.
Illinois:			
Belleville	32,721	54	Yes.
Dixon	11,523	47	No.
Elgin	44,223	83	Yes.
Freeport	22,467	23	Yes.
Jacksonville	20,387	49	Yes.
Kewanee	16,821	60	Yes.
Lincoln	14,362	53	Yes.
Mattoon	17,547	46	Yes.
Mount Vernon	15,600	38	Yes.
Olnay	8,612	16	Yes.
Streator	16,469	65	Yes.
Vandalia	5,471	28	No.
Indiana:			
Bedford	12,562	68	Yes.
Columbus	18,370	42	Yes.
Connersville	15,550	38	Yes.
Crawfordsville	12,851	None	Yes.
Goshen	13,003	None	Yes.
Logansport	21,031	51	Yes.
Madison	7,506	25	Yes.
Tell City	5,735	78	Yes.
Valparaiso	12,028	None	No.
Vincennes	18,831	44	Yes.
Washington	10,987	60	Yes.
Kentucky:			
Bowling Green	18,347	13, 17	Yes.
Campbellsville	3,477	40	Yes.
Corbin	7,744	16	Yes.
Frankfort	11,916	43	Yes.
Glasgow	7,025	28	Yes.
Hazard	6,985	19	Yes.
Hopkinsville	12,526	20	Yes.
Madisonville	11,132	26	Yes.
Maysville	8,632	24	Yes.
Middleborough	14,482	57, 63	Yes.
Richmond	10,268	60	Yes.
Somerset	7,097	29	Yes.
Maine:			
Rockland	9,234	25	
Rumford	7,888	55	No.
Waterville	18,287	35	Yes

APPENDIX VI

EXTRA UHF CITIES FOR 1 CHANNEL PROVIDING SERVICE TO AREAS BEYOND A PRIMARY SERVICE—Continued

State and city	Population	Channels presently assigned	AM station
Maryland:			
Cambridge	10,351	22	Yes.
Frederick	18,142	62	Yes.
Massachusetts: Fitchburg	42,691	None	Yes.
Michigan:			
Alpena	13,135	9, 11, 30	Yes.
Big Rapids	6,736	39	Yes.
Grand Haven	9,536	None	Yes.
Iron Mountain	9,679	8, 27	Yes.
Ironwood	11,466	12, 31	Yes.
Ludington	9,506	33	Yes.
Mantistee	8,642	15	Yes.
Manistique	5,086	14	No.
Mount Pleasant	11,393	[1] 14, 47	Yes.
Petoskey	6,468	31	Yes.
New Hampshire:			
Berlin	16,615	26	Yes.
Claremont	12,811	37	Yes.
Concord	27,988	76	Yes.
Keene	15,638	45	Yes.
Laconia	14,745	43	Yes.
New Jersey:			
Asbury Park	17,004	58	Yes.
Paterson	139,336	37	Yes.
New York:			
Batavia	17,799	33	Yes.
Glens Falls	19,610	39	Yes.
Gloversville	23,684	29	Yes.
Hornell	15,049	50	Yes.
Massena	13,137	14	Yes.
Middletown	22,586	60	Yes.
Ogdensburg	16,166	24	Yes.
Olean	22,884	54	Yes.
Oneonta	13,564	62	Yes.
Saranac Lake	6,913	18	Yes.
North Carolina:			
Elizabeth City	12,685	31	Yes.
Henderson	10,996	52	Yes.
Mount Airy	7,192	55	Yes.
Roanoke Rapids	8,156	30	Yes.
Rocky Mount	27,697	50	Yes.
Salisbury	20,102	80	Yes.
Wilson	23,010	56	Yes.
Ohio:			
Ashtabula	23,696	15	Yes.
Cambridge	14,739	26	Yes.
Chillicothe	20,133	56	Yes.
Coshocton	11,675	20	Yes.
Defiance	11,265	43	Yes.
Findlay	23,845	53	Yes.
Piqua	17,477	44	Yes.
Washington	10,560	None	Yes.
Pennsylvania:			
Butler	23,482	43	Yes.
Chambersburg	17,212	46	Yes.
Connellsville	13,293	None	Yes.
DuBois	11,497	31	Yes.
Emporium	3,646	42	Yes.
Franklin-Oil City	29,587	64	Yes.
Hazleton	35,591	63	Yes.
Lewistown	13,894	75	Yes.
Tennessee:			
Clarksville	16,246	53	Yes.
Cookeville	6,924	[1] 24, 69	Yes.
Dyersburg	10,885	46	Yes.
Morristown	13,019	54	Yes.
Murfreesboro	13,052	18	Yes.
Paris	8,826	51	Yes.
Vermont:			
Bennington	8,002	69	Yes.
Montpelier	8,599	57	Yes.
Newport	5,217	46	Yes.
Rutland	17,659	49	Yes.
St. Johnsbury	7,370	30	Yes.

APPENDIX VI

EXTRA UHF CITIES FOR 1 CHANNEL PROVIDING SERVICE TO AREAS BEYOND A PRIMARY SERVICE—Continued

State and city	Population	Channels presently assigned	AM station
Virginia:			
Blacksburg	3,536	[1] 60	Yes.
Covington	5,860	44	Yes.
Fredericksburg	12,158	47	Yes.
Marion	6,982	50	Yes.
Martinsville	17,251	35	Yes.
Staunton	19,927	36	Yes.
Williamsburg	6,735	17	No.
Winchester	13,841	28	Yes.
West Virginia:			
Beckley	19,397	4, 21, 66	Yes.
Elkins	9,121	40	Yes.
Logan	5,079	23	Yes.
Richwood	5,321	None	Yes.
Weston	8,945	5, 32	Yes.
Williamsport	8,624	None	Yes.
Hinton	5,780	31	No.
Wisconsin:			
Beaver Dam	11,867	51	Yes.
Fond du Lac	29,936	54	Yes.
Marshfield	12,394	None	Yes.
Rhinelander	8,774	22	Yes.
Sheboygan	42,365	59	Yes.
Sturgeon Bay	7,054	44	Yes.
Stevens Point	16,564	20, 26	Yes.
Watertown	12,417	None	Yes.

[1] Noncommercial educational.

APPENDIX VII

A tentative allocation of channels 2–13 to nonbroadcast uses

Frequency, mc.:	*Use*
54.00–54.26	Citizens and ISM.
54.26–56.50	Citizens.
56.50–57.00	Model control.
57.00–58.00	Broadcast pickup.
58.00–59.00	Alarm devices industrial.
59.00–60.00	Electronic protection—general.
60.00–60.50	Hospitals.
60.50–60.70	Highway electronic devices.
60.70–61.70	Highway maintenance.
61.70–62.10	Forestry conservation.
62.10–63.00	Local government.
63.00–63.50	Special emergency.
63.50–64.50	Police.
64.50–65.50	Fire.
65.50–66.00	Physicians.
66.00–67.50	Power.
67.50–68.40	Petroleum.
68.40–68.80	Forest products.
68.80–70.40	Special industrial.
70.40–71.30	Telephone maintenance.
71.30–72.00	Manufacturing.
72.00–74.60	Fixed (no change).
74.60–75.40	Aviation marking (75 mc. center freq.) (no change).
75.40–76.00	Fixed (no change).
76.00–77.00	Highway maintenance.
77.00–77.50	Traffic light control.
77.50–78.00	Alarm devices public safety.
78.00–79.00	Police.
79.00–80.00	Fire.

APPENDIX—VII

A tentative allocation of channels 2–13 to nonbroadcast uses—Continued

Frequency mc.:	*Use*
80.00–83.00	Business.
83.00–84.00	Special industrial.
84.00–86.50	Business.
86.50–88.00	Special industrial.
174.00–203.00	Domestic public common carrier.
203.00–204.00	Electronic protection common carrier.
204.00–205.200	Taxi.
205.200–206.04	Auto emergency.
206.04–207.96	Motor carrier.
207.96–209.16	Buses.
209.16–209.94	Urban transit.
209.94–211.86	Railroads.
211.86–212.86	Hospitals.
212.86–213.86	Aviation terminal control.
213.86–215.86	Highway electronic devices.
215.86–216.60	Business.

Senator PASTORE. We will adjourn until 10 o'clock Thursday.

Senator SCOTT. I may have some questions on Thursday. I will just say that for the record. I did not get a chance to ask them now.

(Whereupon at 4:50 p.m. the committee adjourned until Thursday, February 4, 1960.)

TELEVISION INQUIRY—ALLOCATIONS PHASE

THURSDAY, FEBRUARY 4, 1960

U.S. SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
SUBCOMMITTEE ON COMMUNICATIONS,
Washington, D.C.

The subcommittee was called to order at 10 a.m., in room 1310, New Senate Office Building, Hon. John O. Pastore, presiding.

Senator PASTORE. Mr. Cox had a few points he would like to clear up.

Mr. Cox. Mr. Lee was in the process of presenting his statement.

FURTHER STATEMENT OF ROBERT E. LEE, COMMISSIONER, FEDERAL COMMUNICATIONS COMMISSION; WITH FURTHER COMMENTS OF COMMISSIONERS ROSEL H. HYDE, T. A. M. CRAVEN, FREDERICK W. FORD, AND JOHN S. CROSS

Mr. LEE. Mr. Chairman, I was about to make the point that a good bit of what we have been talking about is television service as it exists today, and I think a very good point could be made for the fact that there is pretty good television service nationally. One of the points that I tried to make is the fact that I think we have a responsibility to future generations. We are chartering a course here, now, that is going to perhaps freeze an inadequate TV situation in the midst of a greatly expanding economy.

I had a few notes here. For example, when we first approved television in 1941, our population was 133 million people. Now, 18 years later, it is 179 million, and the Bureau of the Census tells me that by 1980 it will range somewhere between 230 and 270 million, so certainly we would expect a figure of 250 million. Our national economy in 1941—when we went TV-commercial—the gross national product was around $126 billion. It is now estimated at $485 billion, and again in 1980, in 1957 dollars, it will be around $900 billion.

Now, this trend, the so-called exploding population business, is true in every yardstick that you use, and the point that I wish to make is that in an economy, an expanding economy such as this, the means of advertising are an important adjunct to that economy. There must be outlets through which we can increase and induce additional consumption, let's say, of goods and products. By freezing for all time, in effect, the 12 channels of VHF—which in my humble judgment is what we will come to in the implementation of this so-called interim plan—is not really meeting our responsibilities to the future generations that are yet to come.

Senator PASTORE. If I might interrupt you, Bob, at this point: Wouldn't you agree with me that there are three or four very basic principles or situations that must be recognized, and I quite agree with what you are saying. The only trouble with the recitations we have had before the committee, we have indulged in cliches and we have never gotten down to specifics. And as time goes on the situation becomes even more confused and more scrambled, and as it becomes more confused and more scrambled, the more difficult it becomes to unscramble it.

First of all, I think basically the principles should be that we ought to bring this service gratis to as many homes as possible, and we ought to promote as much as possible the local utility of a broadcasting facility, basically for the reason that there are many things that go on in a community that could be benefited if you got into this area coverage.

When the chairman was here the other day, he made it quite clear that people are not too much interested in some of the things that we were talking about—all they want is the big network, the big program, and if they get it, they don't care how they get it, whether they get it on one station, two stations, or what have you, and they are not interested too much about the problems of UHF as against VHF.

Now, basically, you start out with the principle that you would like to have as much grassroots coverage as you could possibly have—I think no one can challenge that—and they are not getting that very much today. The Commission keeps saying, time and time again, that 97 percent of our people get at least one channel, and because they get one channel everybody ought to be satisfied.

Then, second, you have three networks, and unless you give availability to each one, on an equitable basis, naturally you are going to have an economic situation insofar as competition is concerned, you agree with me on that?

Mr. LEE. Yes, I certainly do.

Senator PASTORE. If NBC overrides CBS, or if ABC doesn't come in—naturally the people of this country are limited to three networks.

Mr. LEE. I would, however, hope that we wouldn't freeze this, and that conceivably we could have a fourth, if we had facilities.

Senator PASTORE. As it becomes more difficult for ABC to get as free an expression as CBS and NBC, you wouldn't expect a fourth to come in. The tougher it is for the third, the harder it becomes for the fourth to come into the field; and naturally you have to keep it as competitive as possible.

Now, of course, we know there are 70 bands that would be available on UHF as against 12 that we are confined to on VHF, but the thing that bothers me most, and I know more or less what your plan is, is how do you unscramble this? What is the Commission thinking about? Is it going to be that we are going to move from the 12 to the 25 channels that were talked about, or the 50 channels we talk about? And if that becomes impossible and we have to stick to the 82—the 12 VHF and the 70 UHF—the big question in my mind is that now you are confronted with the proposition, because nothing has been done over the years, you have 50 million set owners that have an interest in this whole thing.

Now, when we shift to your plan of utilizing UHF to its optimum, have you given any thought to what we do about the average citizen who has bought a VHF set, he has his money invested in it? What is the Commission thinking about in case a change has to come, because the more sets come into the market at one quality or one grade, you see, the harder it becomes to unscramble this thing, because ultimately, whether or not you can do this is going to depend, not entirely but in great measure, upon the politics that may be involved.

You know that even if you come up with the best plan in the world, and you expect to put it into effect: the minute that hits the Congress of the United States, and you get the reaction, let's say from 60 million people, you have got a pretty hot chestnut on your hands. You know that, and even though you may devise the best plan, if you wait too long it may be hard to put it into practice only because of the politics involved.

This thing, as years go by, and as months go by, becomes all the harder to deal with. Now, 6 years ago it was a lot more simple.

Mr. LEE. I quite agree, Senator, and I will take my share of the responsibility of 6 years ago. If we had done, 6 years ago, what I am suggesting that we do now, we would not be here discussing the problem this morning, in my opinion.

Now, I think that one of the real problems—as you say, the political problems—that bothers the Commission is this degree of disruption under any plan. Now, it has been held out as a form of panacea, the fact or the possibility that we would receive more channels from the Government. I think this is a remote possibility, but I would like to make this point, that that is a very disrupting thing as well. And you pay two ways, because if we take something from the Government, the military will have to spend a lot of money to take care of their problems of vacating this band, which is borne by all of the taxpayers, in addition to which every set owner again has to convert. And on the matter of disrupting, I think I would also like to make the point that this matter of the 50-odd million sets in the hands of the public is not entirely accurate. We do have a number of areas that are largely UHF-only, and I would like so—I see Senator Scott is here. I have visited a good many of these areas, such as South Bend. I am going to be in Fort Wayne, Harrisburg, Bridgeport, Peoria, Springfield, and so on—Springfield, Mass. These are not second-class citizens, these are not second-class services.

In the Scranton-Wilkes-Barre area, I looked at every station there, and they are the finest facilities in the country. Television is good; they are very happy. The law of nature under our existing rules if, in my opinion, this interim plan goes to its logical conclusion, meaning you have to give up the U, because you can't justify keeping it if you don't use it, that particular area I don't see how they will have anything. They happen to be surrounded by Philadelphia and New York, who use up all the VHF channels. You would have to put squeeze-in channels on such a reduced basis that I doubt if you could get a service over both Scranton and Wilkes-Barre.

In this area there is something like 12 million people in all of these areas. They would have to reach again. In the Scranton-Wilkes-Barre area, for example, they would have to go to the expense of putting tall receiving towers outside their houses—we have seen this in

parts of the country—and reach for the signals from Philadelphia and New York City. I realize that this is a difficult transition, but it is a matter that really takes some courage and some guts, and I am convinced that when and if the decision is made, and made with the necessary degree of finality, so that the manufacturer would know that he couldn't get a reversal 2 weeks later, that he would proceed to manufacture these sets. And as the chairman has said, I will have 5 years to convert. I feel that the average set will probably outmode itself in 5 years. Make it 10, if you want, as long as it is final and they know it is going to happen.

Senator PASTORE. Now, can you work both of them together in the meantime? Can you cut down the disruption?

Mr. LEE. That is right.

Senator PASTORE. You can do that?

Mr. LEE. We could give them two frequencies, VHF and UHF, and put them on notice that as of "X" date the VHF would no longer be available.

Senator PASTORE. What about this proposition we talked about the other day, where you have U currently with V—the V is more powerful and covers a bigger area, but the U doesn't go out that far? What do you do about that?

Mr. LEE. I think the first frank consideration that we should face is the fact that the VHF is somewhat superior to UHF; but when you are considering that on a comparison of 12 channels versus 70, this doesn't stand up very well.

Senator PASTORE. I realize that, but I am getting into this disruption business, now. You have gone along with the idea that chances are something could be developed, in this period of transition, without disruption on the part of the viewer, which, of course, is going to be the most important factor in this whole element of transferring from one system to another. Where you grant, let's say, to a licensee the right to operate simultaneously—either by obligation, or voluntarily—a UHF transmitter, the argument made here by Mr. Craven, especially, was this: While you are doing this simultaneously, what you are up against is the fact that your UHF is not covering an area at the same time that your VHF is reaching beyond this 40-mile radius. Now, how would you cover that?

Mr. LEE. I would think the operator of the station, having both frequencies for a period of 5 or 10 years, would know what areas, very soon, he was not appropriately covering, and would improve his coverage as well as find ways to fill in, certainly, with improved receiving equipment. And I think that this disparity would be soon overcome, even before it was necessary for him to give up his VHF signal.

Senator PASTORE. Are you saying to me that you would have no disruption at all within the area beyond 40 miles as far as your VHF goes in contrast with the UHF?

Mr. LEE. I think in the transition period, whatever disruption there would be, would be very minimal. I think if we can figure how to put a man on the moon, we should be able to improve a receiving set.

Senator PASTORE. You take the position that it is not a technical impossibility?

Mr. LEE. It is not a technical impossibility in my opinion.

Now, I would point out, you saw charts here the other day, some of which charts you saw I use also in my statement. Many of these measurements, as I tried to point out, are based on existing UHF operations which are not at the maximum. These people can't afford to do with their facilities what the more prosperous VHF operators can do. They are operating on a very much smaller margin. They are not equipped to put up a tower of 1,000 feet; there are 80 or 90 in the VHF band over 1,000 feet, but not in the U.

Senator PASTORE. May I ask a question? In this opinion you suggest, may I say that you stand practically alone on the Commission?

Mr. LEE. I wouldn't say that, Mr. Chairman.

Senator PASTORE. I don't want you to give me other people's thinking, but from your experience in discussing these matters, the plan that you suggest to me now, you stand more or less alone, so far as the Commission is concerned?

Mr. LEE. At the moment, I think there are substantial reservations; but when these other alternatives fail that have been suggested, and I think they will, I think that there will be considerable support. I think this position is so logical, and my colleagues are so fair, that they will, of course——

Senator PASTORE. I am not trying to be facetious, I am trying to crystalize this, because the time has come when we have to have some definitive answers. If it is going to be an impossibility, at the beginning of these hearings, the public ought to be told that.

No. 2, I think we are just kidding ourselves by thinking that by negotiating with the military we will get further bands in the VFH spectrum—that we are actually kidding ourselves.

Mr. LEE. I think it is highly speculative, and I would point out that even in the event you were somewhat successful, I understand there would be serious international problems involved, and Lord knows how long this would take.

Might I add, Mr. Chairman, on this matter of additional support for this position, I think the Commission, to a man, has an open mind on it by reason of the fact that they have endorsed this $2,250,000 budget request* for experimentation in the UHF band. We plan to construct and operate, under contract, a UHF station in the city of New York. My personal position is that I think the engineering that we have, the advice that I have had from competent engineers and our staff, is that the UHF will operate, and can be made to operate, better with improvements available right now.

(* The Commission supplied the following information as to this budget request:)

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C.

EXCERPTS FROM OFFICIAL STATEMENTS CONCERNING THE COMMISSION'S UHF–TV PROJECT

From the budget message of the President (page M43)

"*Regulation of commerce and finance.*—The general growth of the economy, newly legislated responsibilities, and the increased complexity of the problems which confront the regulatory agencies require increases in funds for most of them. The largest single increase in this category will permit the Federal Communications Commission to make a thorough study of ultrahigh frequency television to determine whether channels in this range can be used to meet the needs of the expanding television industry."

From the detailed estimates of the President's budget (page 146)

"7. *Ultrahigh frequency television.*—The Commission proposes to undertake a comprehensive study of ultrahigh frequency television transmission and reception. The study is intended to develop technical information essential to the resolution of the television channel allocation problem. It will involve the use of improved transmission techniques, the development of optimum performance receivers, and extensive field observations and measurements. Because of the nature of this inquiry, the $2,250,000 estimate provides funds for the entire study, which will be of 2 years' duration."

From summary statement of the commission's budget justification (page 15)

"VII. *UHF–TV.*—One of the most serious problems facing the Commission is the question of providing an adequate number of usable channels for television broadcasting. In 1952, the Commission made available 70 channels between 470 and 890 megacycles which have not been commercially successful. One of the factors has been the inability of UHF signals and receivers to provide comparable coverage, with the same reliability and convenience as the more highly developed VHF equipment. It is proposed to undertake a large scale project designed to evaluate the ability of the UHF band to provide coverage to a large metropolitan area and the surrounding area. This will include the design of television receivers incorporating the latest developments, as well as the practical demonstration, transmission, and reception of programs in the UHF band. This will involve the assistance of industrial contractors. This departure from previous policy appears to be justified by the fact that competitive forces in industry have not made it practical for private initiative to solve the technical problems and antitrust considerations provent cooperative industry effort."

VII. ULTRAHIGH FREQUENCY TELEVISION

This section of our budget justification is devoted to the need for and explanation of a special engineering study into the effectiveness of UHF television. Since special skills would be needed for this study for which there would be no continuing requirement by the Commission, it is considered impractical and unwise to build up the Commission's staff to carry out this program. It is proposed, therefore, to have the work done on a contract basis under the close supervision of the staff of the Commission.

It is estimated that $2,250,000 will be required for this project which will extend over a 2-year period. This amount is included in our requirements for "Other obligations" on page 160 under the heading "Other contractual obligations."

The aim of this project is to determine facts which will aid in the resolution of the television allocations problem which has been a source of serious concern to the Congress, the broadcasting industry, and the Commission. A decision is made difficult because of two major interrelated unknown factors; first, whether UHF is capable of providing a nationwide competitive service; and secondly, whether it is practical to effectuate competitive intermixed or UHF-only television allocation. Until comprehensive knowledge of UHF service capability is obtained, there is little hope of successfully utilizing UHF channels on a nationwide basis. Additional channels are needed to make available sufficient choices of program and to provide many cities with their own program sources. Every effort will be made to evaluate the effectiveness of UHF broadcasting, using the most modern transmitting and receiving equipment. The assurance that UHF could be effectively utilized would provide a sound foundation for the Commission's decision in directing the future course of television broadcasting, which is now at the crossroads in its development. The proposed project calls for a special appropriation of $2,250,000 to cover all phases of a development, measurement, and field testing for UHF television.

Commercial television broadcasting began in 1941 in the VHF band which now consists of twelve 6-megacycle channels (channels 2 through 13). As a result of subsequent developments and in order to provide a truly nationwide competitive television system, the Commission in postwar allocations proceedings also made the frequencies between 470 and 890 megacycles available for television broadcasting. Then, in 1952, after lengthy studies and hearings, the Commission adopted a comprehensive and intermixed VHF–UHF assignment plan. The action was based on technical and economic developments which at that time were expected to put the UHF and VHF channels on a competitive

basis. After exhaustive efforts on the part of the Commission to make the intermixed allocation plan work, the Commission was forced to conclude tentatively in its report to Congress this year[1] that there appeared little hope of success of an intermixed allocation because of competitive inequalities arising in part from unequal costs and performance and from propagation disparities on UHF.

The Commission's conclusions were based on an intensive study by the Television Allocations Study Organization (TASO) which was organized by Commission request in 1956. Unfortunately, the industrywide UHF crash research and development program which the Commission anticipated from TASO was limited by the Antitrust Division of the Department of Justice. The TASO study was limited largely to an evaluation of the results obtained with existing equipment and a comparison of UHF and VHF operations. Therefore, much of the information on costs and new developments could not be obtained. Moreover, certain facilities were not available to the industrial groups comprising the TASO panels, leaving large gaps in the information required to adequately evaluate some of the more important engineering factors. Although the TASO data is generally quite useful and adequate for evaluating UHF rural service with existing receiver installations, there is a lack of information for the appraisal of urban area coverage. In particular, there is a distressing lack of information on the effectiveness of UHF in covering large metropolitan areas.

While the Commission is currently negotiating with the executive departments in an attempt to make additional VHF channels available in lieu of the UHF band, there is the distinct possibility that the only solution to the problem will be in the utilization of the UHF allocations. The UHF channels might then be used to supplement the existing VHF channels or, in order to answer the demands of Government and non-Government land mobile communications services, for the ultimate transition of all television broadcasting to a UHF-only system. The future course of television broadcasting would be determined after completion of the investigation herein proposed and would include other considerations submitted by the parties in interest in accordance with the Administrative Procedure Act.

This proposal goes beyond the policy heretofore followed by the Commission; i.e., to engage only in applied technical research essential to the regulation of developments of the industry on its own initiative with a view to providing for the most effective use of the radio spectrum. However, the UHF television situation has not yielded to this approach because receiver manufacturers are understandably reluctant to expend large sums of money in development, design, and tooling of production lines where the foreseeable public demand is slight in comparison with conventional VHF receivers. Also, broadcasters and advertisers are loath to support UHF transmissions which can be received disadvantageously in comparison to VHF. Even though the television manufacturing industry represented by the original TASO concept has been interested in a cooperative effort to solve the UHF equipment and coverage problems, this was made impossible by another agency of the Government. Therefore, to expand television service to the Nation without undue delay, it is necessary for the Government to take unusual emergency action to support the solution of the technical problems pertaining to the public interest as in the case of other segments of the economy and the national defense where industry initiative cannot be expected to provide the technological development necessary to the public welfare and to the industrial and business economy as a whole.

If the television allocation problem cannot be solved by a reallocation of the VHF spectrum, the remaining avenue of expansion lies in the presently allocated UHF band. There is a valid question as why it has not been possible to develop the UHF band for television under the same impetus that other services have successfully developed much higher frequencies for a number of years. As a rather broad generalization, it can be said that the higher the frequency, the more expensive is the equipment at least until the initial production can pay for the development and tooling cost. The incentive for industry to make the investment is motivated by either the potential demand for new kinds of services or an immediate demand for additional services which cannot be accommodated on lower frequencies. For example, microwave relay systems have grown

[1] Statement on behalf of the Federal Communications Commission, presented by John C. Doerfer, Chairman, to the U.S. Senate Committee on Interstate and Foreign Commerce, April 1959. A separate statement by Commissioner Lee advocating the immediate conversion to UHF was submitted on July 8, 1959.

phenomenally because they provide a new radio service. Land mobile radio initially, prior to World War II, largely used frequencies in the 2-megacycle region but now frequencies up to 450 megacycles are regularly used. FM broadcasting provides additional channels for aural broadcasting with an improved fidelity. However, public appreciation of the higher fidelity has been gradual with the result that FM broadcasting has grown slower than expected. At the present time, there appears to be no immediate prospect for an improved television system on the UHF, notwithstanding a visionary hope that a new system could be developed in the future, and the Commission must face the possibility of proceeding with the present transmission standards. These standards, under favorable reception conditions, offer only marginally improved picture and smaller coverage areas with present receivers as compared with VHF. It is generally conceded that if the postwar television were limited to the UHF, that a satisfactory nationwide service could have been developed albeit at a slower pace than with the VHF, which had been developed before the war. While the cost of the overall national transmitting plant may have been greater, the cost thereof is not a major factor in all but the sparsely settled areas. At present, the VHF stations provide a national service which does not provide full coverage for the present networks and does not afford local sources of programs in many areas. The public demand for additional program services has not been sufficient to overcome both the propagation and present receiver deficiencies. Since the development of a broadcast service depends on support of the advertiser, the broadcaster, receiver manufacturers, dealers, and the public; Government sponsorship of a technical development program appears necessary to make possible the television broadcasting structure deemed to be in the public interest both by the Commission and congressional committees.

The present hesitancy on the part of the majority of the Commission to insist on the use of UHF is the question of whether large metropolitan areas can be adequately covered by UHF stations because UHF propagation assumes more nearly the properties of light. Furthermore, building reflections may mar reception. The use of multiple transmitters giving the receiver the choice of selecting the best signal has not been tried in a large metropolitan area. It is proposed to establish a practical two-station set up in the New York metropolitan area employing the most modern transmitting equipment. Existing program sources will be used and operation will be conducted for approximately a year with modern receivers using up-to-date components available for military equipment. Observations will be made under practical home conditions and engineering measurements will be made on the signals in order to give a reliable estimate of reception over the area as a whole.

Propagation of signals in the UHF TV band is characterized by deeper shadows, both in urban as well as in rural areas, and particularly in rough terrain. The shadow effect on reception has been aggravated by the fact that there is more inherent noise generated in UHF receivers and the effective gain of present receiving antennas is less. Furthermore, a secondary limitation is that receivers designed for reception on both VHF and UHF have spurious responses which limit the number of stations which can be assigned in a given area. This latter aspect becomes important if multiple transmissions are required to provide reliable reception of a given program.

It is obviously impractical and unwise to build up the staff of the Commission to carry out this program. Special skills are needed for which there would be no continuing requirement. It is proposed to have industrial contractors perform the work under close supervision of the staff of the Commission augmented through several contract employees. Insofar as possible, contractors will be selected who are not parties in interest in the television allocations problem. Where assistance is available from other agencies of the Government such as the Central Radio Propagation Laboratory of the National Bureau of Standards, these resources will be utilized on a transfer of funds basis if necessary. Where skills are needed from the television industry, such as in the transmitters, their purchase or lease would be on the basis of competitive bidding on strict specifications. The development of receivers would be solicited from the best qualified laboratory. In any case, the designs and patents would be placed in the public domain under the terms of the contract and made freely available to all manufacturers. Special care would be taken to have the measurements and observations made by disinterested but competent organizations under close supervision by the Commission's staff.

Preliminary work will be carried out by the present staff during 1960. The effort will be directed toward building of the transmitters and receivers during 1961, actual transmissions and measurements during fiscal year 1962, and the data analyzed and reported upon in early 1963. It is likely that supplementary tests will be made by industry and the data on receiver design would be made available as the work progresses. However, the project is designed to be self-sufficient and independent of voluntary industry support.

While the success of a UHF television system is dependent on cost factors which are not completely predictable, it is believed that the proposed program of development and evaluation will yield a definitive answer to the usability of the UHF band from a technical standpoint.

Transmitter installation

Because it is believed that New York City will present UHF TV with its most difficult problems of metropolitan area coverage, it is preferred as a site for this project even though it is now adequately served by seven VHF stations. It is proposed that at least two UHF TV stations of at least 1 megawatt power be installed in New York City, one on a tall building in the midtown area and the other at a location about 15 miles further uptown. They would operate on different channels. If it is found infeasible to negotiate an installation on a tall building, a 1,000-foot tower might be constructed at a satisfactory site elsewhere. The other installation might well be made at a location with an existing tower, such as the former Armstrong FM station at Alpine, N.J., now owned by Columbia University. An intensive study on site feasibility is required before contracts for station construction can be issued.

Receiving installations

It is proposed to make at least 100 good receiving installations scattered strategically throughout the New York metropolitan area. These installations would be shifted in location at scheduled intervals to increase the sample size and the effectiveness of the measurement program. These receiving installations would be made for the most part at the homes and apartments of interested and responsible persons interested in the technical aspects of television broadcasting. A carefully devised program of technical observations would supplement the qualitative checks and comparison provided by these observers. Present VHF reception would serve as a reference. No studies would be involved but it is hoped that programs of present VHF stations would be transmitted in rotation to facilitate the comparison of reception.

The receiving equipment to be installed would be representative of the most advanced state of the art. As our receiver development program progresses, the equipment thus developed would be employed in the receiver installations. It is expected that both a substantial superior UHF TV tuner and a converter would result from the developmental program and would be tested in the various receiving installations.

Propagation measurements and tests

Portable equipment would be used for observing picture quality and measuring signal strength from both UHF stations. This equipment would be employed in making a large number of observations throughout the entire metropolitan area under typical operating conditions. The results are expected to provide an adequate evaluation of the service available from a single UHF TV station, as well as from a pair of UHF stations in a "multicast" operation.

With so advantageous a setup under carefully controlled conditions, it would be extremely desirable to make a number of special propagation tests and other measurements at both UHF and VHF. Most of these special measurements could be made in conjunction with the primary quality and signal strength measurements. Consequently, the outlay in both financial and manpower costs for these tests would be substantially lower than would be the case if such measurements were made under different conditions. Practically all of these special measurements are directed toward the investigation of factors recognized by TASO as important to the evaluation of UHF and VHF operation but which are not yet resolved. These measurements would be expected to evaluate such problems as:

(*a*) The signal strength for both UHF and VHF in buildup areas is depressed below that which would be encountered over similar terrain in rural areas. The amount of depression is proportional to frequency as well as to the

industrialization and concentration of population for the area. However, there is not enough data available to permit sufficiently accurate estimates of this factor at either UHF or VHF. Much useful data could be accumulated for a better evaluation of this depression factor.

(*b*) It appears from limited tests made by the Bell Telephone Laboratories that the higher frequency signals penetrate into buildings with less loss in signal strength than those at lower frequencies. The Bell Laboratory measurements were, however, made only at 35 and 150 Mc and only at the lower floor levels. More data is needed to evaluate properly this penetration factor which should favor the UHF.

(*c*) Ghosting or multipath effects can seriously degrade the television picture. There are no known quantitative measurements on this factor but qualitative reports indicate that ghosting is a serious problem in big cities and that it is more serious at VHF than at UHF. Sufficient quantitative measurements on the direction of signal arrival and relative signal strength should help appreciably in evaluating this problem.

(*d*) A very important but little known factor in TV service to large cities is the man-made noise level from such things as neon lights, electrical machinery, automobile ignition, and industrial equipment. Although qualitative reports indicate that man-made noise is a more serious limitation to television service at VHF than at UHF, a definitive investigation of the extent to which man-made noise limits TV service in large cities is needed.

(*e*) From measurements reported to the Commission, it appears that the use of circular polarization could improve very materially the reception of television in weak signal areas. Theory indicates that the use of circular polarization permits a choice of the most favorable mode of polarization at the receiving point and provides a built-in discrimination against ghosts and most types of interference. The use of circular polarization is more practical at UHF than at VHF because of the physical limitations on the size of television receiving antennas. Much more data are needed to confirm theory and to evaluate the practical advantages to be gained from the use of circular polarization. Accordingly, it is proposed to devote a portion of the project effort to making comparative measurements of the available receiver terminal voltages, signal-to-noise ratios, ghosting, and interference reduction provided by circularly polarized UHF transmissions.

(*f*) The techniques of offset and precision offset (including very precise offset) offer outstanding advantages in reducing cochannel interference. Offset operation is now in general use in both the VHF and UHF bands. Precision offset has advantages over offset operation, but when used by groups of more than two stations requires the maintenance of "very precise" frequency accuracy and stability, about $\pm$ 1 cps. It has not been determined as yet whether it is practicable for stations to operate with this stability and accuracy, especially in the UHF band. Development in oscillator stability and control indicate that such stability and accuracy of control might be met at the transmitter but tests are required to ascertain whether this high a precision is maintained in propagation through the troposphere. Propagation tests of this type at both VHF and UHF would therefore be highly desirable.

(*g*) It is also necessary to determine whether there are any adverse effects peculiar to UHF which can impair color transmission. Although there has been no indication of such effects, this is one of the factors which should be verified by observation in many actual receiving installations.

(*h*) There are both qualitative and quantitative measurements which indicate that the full gain of a UHF receiving antenna is not always realized. Quantitative measurements made in England indicate that the loss is not substantial but qualitative measurements made by RCA in Washington, D.C., and New York indicate that these losses may be appreciable in heavily built-up areas. It is proposed that measurements on UHF antenna gains be made during the project to evaluate this factor.

The estimated cost of the propagation measurements and tests is in the order of $475,000.

UHF receiver and antenna improvement

Although the Commission does not regulate the design or performance of TV receivers (except as to radiation from them), performance of receivers used by the public contributes to the coverage provided by TV stations. UHF–TV receivers presently on the market do not incorporate the more recent tech-

nological developments so that their performance is markedly inferior to that which reasonably might be expected of them. At present, most UHF receivers suffer in comparison with VHF receivers in the matter of sensitivity, selectivity, frequency stability, and interference susceptibility. Accordingly, in order for the objectives of the proposed project to be gained, it will be necessary for the Commission to provide itself with receiving equipment designed according to current knowledge so that the results obtained shall represent the present state of the art.

Because the quality of television service and coverage range of TV stations are so dependent upon the performance of the home receiver installation, improvements in the receiver will produce major benefits for UHF–TV broadcasting. (A study of recently evolved basic devices, such as the parametric amplifier to tunnel diode given reason to expect that such devices may provide the means for much needed receiver improvement. Both the parametric amplifier and the tunnel diode are capable of providing greatly reduced noise figure and greater gain than is provided with conventional UHF input circuits. The application of such devices to UHF receivers would materially decrease or eliminate the present inferiority of UHF receiver performance relative to VHF receivers.) It is, therefore, proposed to conduct research and development work directed to receiver improvements and to design of converters to enable VHF sets to receive UHF signals efficiently. The objective would be to produce prototype models of tuners, receivers, and converters incorporating the most effective circuits and devices available and which are practical and economically feasible. A limited number of such models would be made for use in observing the test transmissions and determining the quality of coverage of the UHF transmissions with improved receivers. This work would be under contract by some organization outside of the broadcasting or receiver manufacturing industry.

Present Commission rules require certain mileage separations between stations separated by certain numbers of channels. These separation requirements based on spurious receiver responses, are known as "taboos." They affect the availability of station assignments on 18 channels with reference to the channel to which a given station is assigned. The taboos were specified in 1952 on the basis of estimates available at that time on probable characteristics of UHF receivers and the interfering effects produced by signals having certain channel relationships to a given assigned channel. Since the taboos substantially reduce the number of channel assignments otherwise possible, it would be timely to reexamine them now to determine whether any can be reduced or eliminated. Such reexamination of the taboos can now be based on receiver performance which is known to be achievable as a result of receiver improvement research. It is contemplated that this study would be conducted primarily as a field test, with observations being made at actual installations of receivers throughout the coverage area, with interference being stimulated by portable transmitters or signal generators.

The receiving installation includes an antenna and a transmission line connecting the antenna to the receiver. It is found from study of currently available transmission line characteristics that there is an appreciable loss of signal power in the transmission line. Reduction of the line loss would, therefore, contribute to the improvement of station coverage. Research and development would be done to improve transmission lines for use in UHF TV reception. Although improvements might follow established conventional designs, there is a possibility that some new form of transmission line might be found advantageous.

There is a similar opportunity for improvement of receiving antennas at UHF. Although present antennas have substantial gain at UHF, it would be desirable to have available UHF receiving antennas with even greater gain of simple construction and having electrical and mechanical characteristics particularly suitable for use in UHF TV reception. Using present knowledge of antenna theory, it is possible to produce many different antenna designs; and it is expected that efforts in this direction would lead to more effective and practicable UHF receiving antennas.

TABLE I.—*Estimated cost breakdown*

Receivers (research, development, production, and installation)	$575,000
Transmitter plants (transmitters, antennas, installation, tests and operation)	1,150,000
Measurement program	475,000
Analysis of data and reports	50,000
Total	2,250,000

We can demonstrate by this project that it will do precisely what the engineers say it will do in the worst area of the country, and this should end all arguments.

Senator PASTORE. This project that you speak of will also include this minimum dislocation or disruption on the part of the public?

Mr. LEE. Well, of course, the project would be strictly experimental.

Senator PASTORE. But would it resolve that point?

Mr. LEE. Yes, I fully expect it will.

Senator PASTORE. If you come up with a plan, no matter how good it is, if it means that a lot of people have to discard their sets or spend a lot of money to convert them, we are just wasting our time, let's face it. Senator Scott.

Senator SCOTT. Bob, I have a few questions. Following up what the chairman says, it does not seem that people want UHF badly enough to pay these extra costs of $25 to $125, and I have had some experience and observed some situations where when you try to force the American people to do something, they have their own ways of seeing that it doesn't come to pass. I need only mention prohibition.

These adjustments that cost $25 to $125—doesn't your program really say we are going to force the American public to buy these things, and as soon as you say you are going to force them to buy them, won't the manufacturers pretty much stabilize the price if they think the public is forced to do it; and do you think we ought to try to force the people into buying stuff that they don't want to buy?

Mr. LEE. Well, I think that the manufacturer would readily see a great market for the sale of this set. I am convinced that if the history of all mass production follows in this instance, and there is no reason why it shouldn't, that the improved all-channel set should not cost very much more. And with respect to forcing people to pay more than they already do, there are substantial numbers of citizens in your State who are being forced now.

Senator SCOTT. I know a little something about being forced, but I will tell you a story about it. One of these mechanics took my set away for about 4 months, didn't bother to fix it, sent it back and charged me about $5 or $7.50 for a service charge in taking it away.

Now, frankly; it will be some time, before he gets that money, and I think I am rather typical of the American people in that regard.

Now, the chairman has covered this matter of dislocation of present service, but isn't it a fact that no VHF has ever been taken off the air, and UHF substituted, aside from that pending case in Evansville, Ind.?

Mr. LEE. We have removed several assignments; not nearly enough. I don't believe we have taken one off the air. We removed assignments in Springfield, Peoria, Evansville. In Elmira we denied a drop in V. That is about the extent of it. We had an opportunity

to do this in, I think, 13 areas. I think we should have done it. Now, maybe it is too late, too tough now; but I think at the time we should have done much more.

Senator SCOTT. On the assumption that television needs large markets to support it, has there been any demand for the service you propose? Have there been widespread complaints about the present service; are people really demanding what could result in all-UHF service?

Mr. LEE. I very honestly say I don't think there is any public demand for an all-UHF service. It would be a somewhat unpleasant thing to do; but I feel that as a Government agency, we have a responsibility to be ahead of this demand, and to provide for future requirements.

I might point out, too, Senator, that with respect to what you could do with the existing VHF band, this would solve many problems in other services, manufacturing fields, police, fire, and so on.

Senator SCOTT. I was going to get into a line of questions, but our time is brief, and I would like to just cover a couple of things very briefly. This has to do with the proposed rules, the five alternatives, and so on.

If you break down mileage separation requirements, getting away from your proposal now, but generally speaking, how would you protect the small town and the suburban and rural group which now has service from loss of service by interference from new stations?

Mr. LEE. I don't think it would be fair to the Commission, really for me to speak, as a minority man on that. I did want to make the point, when we were speaking of helping the third network, for example, ABC, that certainly in my opinion this interim plan is going to give them something less than a comparable facility. They really won't be competing equally because you will be giving them something smaller; but I would like on behalf of the majority, for someone else to answer that question.

Senator SCOTT. Commissioner Hyde?

Mr. HYDE. Senator Scott, the Commission has a notice of rulemaking inviting advice and assistance from interested parties, and particularly from experts, who will assist in examining this question as to what the consequences of the proposed short separations might be.

Senator SCOTT. Wouldn't it be desirable to decide beforehand which are the critical markets, and then permit short separations only in those markets rather than handle it on a case-by-case approach? In other words, wouldn't that be a better way to avoid the dangers of serious interference to existing service?

Mr. HYDE. I would give you my opinion that unless some method is found to confine this operation to a reasonable application, it could very well result in a complete abandonment of interest in the ultra-high channels, which I think would be most unfortunate.

Senator SCOTT. Well, I have just this last comment, which doesn't necessarily call for an answer, but those of us from States like Pennsylvania, which have large suburban and rural populations, we would be pretty unhappy if the FCC were to permit the addition of stations in critical shortage areas to result in the degrading of the technical

quality of the service now provided those who live in outlying areas; and we have some fear that we would see repeated, in television, this rather unhappy record of service deterioration of radio, and we would like to have serious consideration given to that aspect.

Would any of the other Commissioners want to comment on that matter of separation?

Mr. FORD. There is one thing with respect to Commissioner Lee's idea of voluntary transition with respect to sets that I think is particularly relevant, and that is the experience in FM. FM channels were assigned and duplication was permitted of AM, and most sets, as you know, are AM sets and not double sets. The result has been that over a period of years, at the present time, there are roughly 18 million FM sets and 125 million AM sets, so that I think that is evidence that that approach is not a practical approach.

Senator SCOTT. Commissioner Lee, would you complete your statement?

Mr. LEE. There was one point that I think I overlooked with respect to this matter of demand. There is certainly demand for facilities, for additional facilities, from the educational people. We have 259 noncommercial educational channels, 88 of which are in the VHF band and 171 are in the UHF band. Now, the abandonment of the U pretty much closes the door on any expansion at all of educational TV. I have seen some of these operations. As a matter of fact, one of the better that I have seen is in Pittsburgh, and I think some of your staff were there. And many of these large cities are completely foreclosed, they would be foolhardy to go into UHF under present conditions.

Washington, D.C., for example—you might say the capital of the world—I think this is a real shame that there is not an opportunity, in effect, for an educational station. There is an assignment here of a UHF station, and they would be very foolish to spend the kind of money it would take to put this on the air for educational purposes.

I wanted also to impress upon you, if I could, the fact that the UHF is not as bad propagationwise as many people say; and I think I made the point several times that they are typically located in small communities that national advertisers normally shun. The average installation has an effective height—that is the tower—of scarcely more than half that of the VHF stations, roughly 640 feet as against an average in the VHF band of 987.

I think there are something like 84 VHF stations with towers in excess of 1,000 feet, none in the UHF bands; and I think the point might be made that the UHF range is not necessarily limited by propagation qualities, but by poor transmission facilities, poor receivers now in use. The market isn't there. Your people around Wilkes-Barre would back me up.

Incidentally, in that area they have many mountainous places, as you know, and the broadcasters, themselves, have combined on some kind of a basis to provide, here and there, some community antennas to fill in these services, so that the people actually are quite content with that service in that area.

I think that is about all I had to say, Mr. Cox. My statement is in the record, I appreciate that.

Senator SCOTT. I have just one comment, not on this subject, but I would like to ask whether the Commission has any jurisdiction—I suspect you haven't—but all this talk about time for public service broadcasts. I have been told that the networks, whose generosity exceeds any comparison when one thinks they are willing to give us 1½ hours of public service every 2 or 3 weeks, additional—but be that as it may, I understand when they do give this prime public service, they are planning to put it opposite, put that service opposite some program with which they can't compete, anyway, like one of the other networks putting it on when Ed Sullivan is on; or when some particular show has 80 or 90 percent of the public interest, they will give you 10 percent for public service program, and they will call that prime time, because it is on at night.

Now, if that is what they are up to, that amounts, in my mind, to deceiving the public; and it also amounts to an evasion of their public responsibility, and unless we do get more public service time and high quality, there are a lot of people who are still going to have their present—retain their present low opinion of television programing.

I might add just one story. Among members of the bar, whenever a lawyer is asked what kind of practice he has, he always says he doesn't practice criminal law, as if it were something to be ashamed of. Actually, I think the defense of individuals is something of which we ought to be proud, but he quickly explains that his firm doesn't have any criminal law practice. Now, the public is adopting the same kind of an attitude when they hastily say, "Well, personally, I don't look at television, except one or two programs," and that is the same indication that they think that there is something low or degrading about being a television addict. There is no great pride among people who say, "I am very fond of television; I look at it all the time; I follow programs with great interest."

Now, I just want to get it off my chest; but I don't suppose there is much the Commission can do about that, is there, because you get into the dangerous area of telling other people what to tell the public, and you run into the first amendment, and so on.

Maybe I have answered my own question, but if anyone has a comment on it that would be enlightening, I would certainly appreciate it.

Mr. HYDE. Senator, this is a subject that the Commission is examining now. We have heard testimony for several weeks from various points of view. The very points that you have raised have been raised in the hearings, as you might expect.

Serious questions have been raised as to what extent a Government agency should undertake to indicate program standards, even if you first establish that they would have the legal competence to do that. It has been strongly urged on the Commission that in the area of expression and taste, we would better rest upon the judgment of the public than upon any group of Government regulators, however well intended their efforts might be.

I think you would be very much interested in some of the briefs and testimony that has been submitted to us. We will be examining it with great care in the next few weeks.

Senator SCOTT. I agree it is a very dangerous area, when you get into what someone might well consider thought control; but I am thinking in terms of perhaps the educational effect, and the influence of a group of experts in the field, specially chosen as you are, from the standpoint of trying to create a climate around which might result in some improvement in this peep-show presentation, which is probably one step below Punch and Judy at the present time on most shows. And I am not going to advocate Government control or interference, because I don't like that much, myself.

Mr. HYDE. Well, Senator Scott, not to seemingly defend any particular service, but just to call to your attention some of the argument and some of the testimony that has been presented to us: It has been urged upon us that there is a good deal of criticism not based on close examination of the availability of programing. Last evening, persons choosing to do so, could have observed a very fine classic—I refer to "The Tempest," now, just because this was last evening.

Analysis of program material would probably bear up better than some of the broad generalizations you have heard about television would indicate. I am not indicating by this statement to you that I don't think that much needs to be done. It has been urged in these hearings that what we need is a higher sense of responsibility, a better effort on the part of those responsible, and perhaps a more definite identification of those responsible.

We have heard testimony about the position of the affiliate who gets his programs from the network without perhaps as much opportunity to examine it in its preparation as he would want. The networks, of course, will tell you that affiliates get more opportunity than some of them have seen fit to exercise. And there have been suggestions that advertising has taken over in an area where there should be management from those who are expert in broadcasting as a service in its own right.

These are some of the questions that we have been examining in our hearings. Now, I think that you will observe from evidences that have appeared in the press, and I think you would find other evidences of it in the hearing, that just the examination of what is going on is having a very healthy influence in these services.

I mention these considerations to explain that what we have here is not a problem of easy solution, or the answers are abvious—it is one that must be worked out with care if we are to maintain the advantages of competitive, free enterprise effort, avoid undue restrictions in the matters of taste and expression, and at the same time avoid abuses and excesses and downright chicanery.

Senator SCOTT. Well, when you have your conference on February 19, it would be very helpful if the Commission were at that time prepared to give us some further comments, perhaps somewhat more definitive.

I don't mean to imply that all programing is terrible. I notice, I think, an improvement while these investigations are going on. I hope it continues, and I am glad Will Shakespeare is back on the boards. [Laughter.]

Mr. HYDE. I only referred to this one, because it was just last evening.

Senator SCOTT. He is a good man; he will go far. [Laughter.]

Mr. HYDE. Sometimes he is referred to as an answer to those who would have all violence removed from the TV screen.

Senator Scott, my attention is called to the fact that this show that I referred to, simply because it was a very recent one, had been scheduled many months ago, long before these present inquiries.

Senator SCOTT. Well, I am glad to hear it. You just get skeptical up here.

Mr. Cox.

Mr. Cox. Commissioner Lee, you have stated, both this morning and in your prepared statement, some concern about the impact of the Commission's proposal to consider an interim plan of dropping in VHF assignments as a threat to all-UHF.

Is this concern somewhat limited, or lessened, by the precise proposal set forth in the rulemaking proceeding, in which they set out the conditions under which they think such grants should be made, or such allocations should be made?

Mr. LEE. I think it goes even further than that. I don't see how you could hold the line to the so-called important markets. I don't see how we can decide that because they are big, and because they need a third network, that here is where we will draw the line. I think the pressure will be on, on the part of most existing UHF operators, to get some kind of swap, under some conditions that would make it difficult for us to turn down. If we can give it to a large market, I think we would be hard pressed to deny it to a smaller market.

Mr. Cox. But the dropping in of a V channel in Birmingham, or Toledo, where you have VHF stations and no present UHF conversions, would not in itself be a threat to UHF?

Mr. LEE. In those instances, I would see no problem.

Mr. Cox. Your concern is that once this is done, the Commission will be subjected to pressure, which it would find hard to resist, to extend this to Scranton-Wilkes-Barre?

Mr. LEE. Perhaps.

Mr. Cox. Isn't the answer to that possibly your suggestion a while ago that you don't think there really would be any VHF assignment possible to that community, except at such short separations that the Commission would be very reluctant to consider it?

Mr. LEE. I have been told, in that particular area, by some of our engineering staff that in order to protect the existing stations in New York and Philadelphia, and I think one other town there, that the powers would have to be so limited that you really wouldn't have much of a signal.

Mr. Cox. What advantage would there be to the UHF operator in that community to seek a substitute V if all you are doing is requiring him to replace his transmitter and yet get a substantially reduced service for his viewers?

Mr. LEE. I would expect that the further depressing effect of this on the manufacturer of sets would give him the problem of deciding whether or not he would rather have something less in the VHF band that would not give him the conversion problem that is worsening day by day, vis-a-vis continuing to fight this problem of a makeshift converted set.

Senator SCOTT. I agree it is a very dangerous area, when you get into what someone might well consider thought control; but I am thinking in terms of perhaps the educational effect, and the influence of a group of experts in the field, specially chosen as you are, from the standpoint of trying to create a climate around which might result in some improvement in this peep-show presentation, which is probably one step below Punch and Judy at the present time on most shows. And I am not going to advocate Government control or interference, because I don't like that much, myself.

Mr. HYDE. Well, Senator Scott, not to seemingly defend any particular service, but just to call to your attention some of the argument and some of the testimony that has been presented to us: It has been urged upon us that there is a good deal of criticism not based on close examination of the availability of programing. Last evening, persons choosing to do so, could have observed a very fine classic—I refer to "The Tempest," now, just because this was last evening.

Analysis of program material would probably bear up better than some of the broad generalizations you have heard about television would indicate. I am not indicating by this statement to you that I don't think that much needs to be done. It has been urged in these hearings that what we need is a higher sense of responsibility, a better effort on the part of those responsible, and perhaps a more definite identification of those responsible.

We have heard testimony about the position of the affiliate who gets his programs from the network without perhaps as much opportunity to examine it in its preparation as he would want. The networks, of course, will tell you that affiliates get more opportunity than some of them have seen fit to exercise. And there have been suggestions that advertising has taken over in an area where there should be management from those who are expert in broadcasting as a service in its own right.

These are some of the questions that we have been examining in our hearings. Now, I think that you will observe from evidences that have appeared in the press, and I think you would find other evidences of it in the hearing, that just the examination of what is going on is having a very healthy influence in these services.

I mention these considerations to explain that what we have here is not a problem of easy solution, or the answers are abvious—it is one that must be worked out with care if we are to maintain the advantages of competitive, free enterprise effort, avoid undue restrictions in the matters of taste and expression, and at the same time avoid abuses and excesses and downright chicanery.

Senator SCOTT. Well, when you have your conference on February 19, it would be very helpful if the Commission were at that time prepared to give us some further comments, perhaps somewhat more definitive.

I don't mean to imply that all programing is terrible. I notice, I think, an improvement while these investigations are going on. I hope it continues, and I am glad Will Shakespeare is back on the boards. [Laughter.]

Mr. HYDE. I only referred to this one, because it was just last evening.

Senator SCOTT. He is a good man; he will go far. [Laughter.]

Mr. HYDE. Sometimes he is referred to as an answer to those who would have all violence removed from the TV screen.

Senator Scott, my attention is called to the fact that this show that I referred to, simply because it was a very recent one, had been scheduled many months ago, long before these present inquiries.

Senator SCOTT. Well, I am glad to hear it. You just get skeptical up here.

Mr. Cox.

Mr. Cox. Commissioner Lee, you have stated, both this morning and in your prepared statement, some concern about the impact of the Commission's proposal to consider an interim plan of dropping in VHF assignments as a threat to all-UHF.

Is this concern somewhat limited, or lessened, by the precise proposal set forth in the rulemaking proceeding, in which they set out the conditions under which they think such grants should be made, or such allocations should be made?

Mr. LEE. I think it goes even further than that. I don't see how you could hold the line to the so-called important markets. I don't see how we can decide that because they are big, and because they need a third network, that here is where we will draw the line. I think the pressure will be on, on the part of most existing UHF operators, to get some kind of swap, under some conditions that would make it difficult for us to turn down. If we can give it to a large market, I think we would be hard pressed to deny it to a smaller market.

Mr. Cox. But the dropping in of a V channel in Birmingham, or Toledo, where you have VHF stations and no present UHF conversions, would not in itself be a threat to UHF?

Mr. LEE. In those instances, I would see no problem.

Mr. Cox. Your concern is that once this is done, the Commission will be subjected to pressure, which it would find hard to resist, to extend this to Scranton-Wilkes-Barre?

Mr. LEE. Perhaps.

Mr. Cox. Isn't the answer to that possibly your suggestion a while ago that you don't think there really would be any VHF assignment possible to that community, except at such short separations that the Commission would be very reluctant to consider it?

Mr. LEE. I have been told, in that particular area, by some of our engineering staff that in order to protect the existing stations in New York and Philadelphia, and I think one other town there, that the powers would have to be so limited that you really wouldn't have much of a signal.

Mr. Cox. What advantage would there be to the UHF operator in that community to seek a substitute V if all you are doing is requiring him to replace his transmitter and yet get a substantially reduced service for his viewers?

Mr. LEE. I would expect that the further depressing effect of this on the manufacturer of sets would give him the problem of deciding whether or not he would rather have something less in the VHF band that would not give him the conversion problem that is worsening day by day, vis-a-vis continuing to fight this problem of a makeshift converted set.

Mr. Cox. But the impact on availability of sets would come only if the Commission went beyond what are presently all-VHF areas and got into areas where it would start trenching upon the replacement market for UHF?

Mr. LEE. I think the existing plan, while it says that it would not be implemented where it would have an impact on UHF, I think under the plan that in a two-station market, with perhaps a struggling U, a third V would be dropped in under this plan and depress the U. And my concern is that in the overall picture, Madison Avenue would think even less of the U than they do now; the manufacturer would give it less attention; and perhaps your converter, or whatever you use, would become even less meaningful than it is now, and the whole picture would depress.

Mr. Cox. In your prepared statement, you indicated that you felt there were still many areas in which UHF operations would have more than a fair chance of survival if competing VHF stations were converted to UHF—in other words, there are still further possibilities for deintermixture. Could you supply for the record a list of such areas, or do you have typical examples in mind?

Mr. LEE. I was thinking, really, of the old deintermixture cases. I think we had 13 areas that looked very ripe at the time, and I think that these even could be reconsidered, and I am thinking of——

Mr. Cox. Because of the continued existence of conversion of those markets, which would make it less disruptive?

Mr. LEE. I don't think, for example, Hartford, or Madison, would be a major disrupting factor. You have a very high rate of conversion.

Mr. Cox. Now, you indicate, also, that the exploration of the possibility of a transfer of television to the UHF, which was proposed in the Commission's report and order of June 1956, as the only proposal worth further study, has not been seriously undertaken. What do you think perhaps should have been done in the intervening 3½ years that was not done with respect to such a detailed consideration as was indicated was being undertaken at that time?

Mr. LEE. Well, I think that I was referring there to the so-called TASO study, the Television Allocation Study Organization. At the time this so-called crash program was suggested, the areas of exploration were carefully set out in our published documents, that in effect would require a careful examination of the UHF vis-a-vis the VHF, and a suggestion as to No. 1, whether or not we should convert to the UHF, and, No. 2, if not, what alternate plans would come about.

The TASO—and I am not at all questioning their motives, there might have been some antitrust implications in the reasons why they did not go into these areas; the fact of the matter is that they did not, and our staff so advised us—that they were not going into these areas, and we would not have these problems answered.

Now, they did make measurements, valuable measurements. Incidentally, where the terrain was appropriate the measurements would show the UHF equal to the V. This even surprised me, at very considerable distances.

Mr. Cox. Fresno, for example?

Mr. LEE. The area I am thinking of is Fresno—at 125 miles they found the UHF signal equal to the V. For purposes of their averages—and I don't quarrel with this—they withdrew that calculation

from the study, because it is a unique propagation area. I cite that as an illustration that the U is not all bad.

Mr. Cox. Now, do you suggest that when the Commission learned, shortly after TASO was established, that because of antitrust problems and other considerations it was not going to be able to serve as the means for an expedited program of research and development, that perhaps the tests which are now being proposed for New York could have been undertaken in this interval by the Commission as a means of checking out the possibilities of a shift to UHF?

Mr. LEE. Well, this particular budget item actually was a suggestion of the staff. I don't know what prompted them to make this suggestion, but these engineers apparently were concerned about more data; and I am sure part of their problem was the fact that we did not get what we thought we would get in this area from TASO.

Mr. Cox. You cite in your prepared statement some efforts by Dr. Town, the executive director of TASO, to channel its activities more toward a study of UHF alone, and his lack of success in that regard. Did the Commission make any efforts to redirect the efforts of TASO when this was learned.

Mr. LEE. I do not recall that they did; no, sir.

Senator PASTORE. Well, now, can anyone else answer that question either one way or the other? I don't think the answer should be confined to one Commissioner here. This is important.

Mr. CRAVEN. I don't recall Commission action in this area; but I do recall, however, that the study was circumscribed very extensively by the Department of Justice fears concerning antitrust matters, and that fear was also shared by many of the people of the industry who were in the manufacturing business. The study was conducted, in a sense, under the monitoring of Government people who were representatives from the Commission on each of the panels and subcommittees, with the sole duty of being certain that the antitrust statutes weren't invaded.

Mr. Cox. But wasn't this concern about the implications of antitrust largely in the field of concerted efforts to develop improved equipment, and not so much in the question of what kind of measurements ought to be undertaken, or what kind of studies might indicate areas in which UHF broadcasting could be improved?

Mr. CRAVEN. In the latter part of your statement, the antitrust consideration came in there, because that involves standards, and things of that kind. As to the first part of your question, if I understood you correctly, the antitrust did not affect it.

Mr. Cox. As I understand, I think in one instance that Commissioner Lee points out, Dr. Town at one time suggested that the possibility of tests on alternate UHF channels would be feasible, and this was something nothing was done about. I do not see—you can correct me, perhaps—how antitrust would have inhibited a test of that kind.

Mr. CRAVEN. That was included in the first part of your former questions as I indicated before.

Mr. Cox. In other words, there were things TASO could have done in the line of simple research and the determination of facts, which the Commission had indicated would be useful to it in connection

with its concern about the possibility of shifting to all UHF, which were not done?

Mr. CRAVEN. I don't want to answer that categorically, because I am certain there is an element of large cost involved.

Mr. Cox. An element of cost?

Mr. CRAVEN. Yes.

Mr. Cox. You avoid this if the Commission is successful in its budget request, and I think the record of the earlier hearings on this subject before this committee will indicate suggestions by certain members of the committee that perhaps Government financing, for some of this research, might be necessary. You are suggesting that perhaps this cost factor can only be overcome through the actual expenditure, under Commission control, of public funds to do what the industry either is not willing to do at its own expense, or can't do because of antitrust problems?

Mr. CRAVEN. That is my personal opinion.

Mr. Cox. Commissioner Lee?

Mr. LEE. I would like to—I don't want to be misunderstood as being unnecessarily critical of TASO. I happen to believe in industry committees. In the defense area we are using them to very great avail. I merely point out the fact that we did, in 1956, put out a public notice on TASO indicating that they were to assemble facts relating to the feasibility of transferring the operation of television broadcasting to the UHF spectrum space. This they did not do.

Mr. Cox. I gather from your statement that this was called to the Commission's attention in January of 1958, and I think the record will show, nonetheless, that the Commission appeared before this committee subsequent to that time in 1958 and, in response to questions as to what might be expected, referred to the pending studies of TASO as being preclusive of making present judgments, even though apparently it was already known in the Commission that certain answers simply would not be obtained, because no investigation would be made.

Mr. LEE. Well, this memorandum pointing out this problem was dated January 13, 1958. Now, it may be that this, of course, being a voluntary group, it may be that the Commission felt a little reluctant to push them, or crowd them. If you have a voluntary group, you like to leave them free.

As a matter of fact, part of our reasoning on this budget request is prompted, somewhat, by the House Appropriations Subcommittee, which in the past has criticized us for not doing more of our own research under Government funds instead of seeking it from industry.

Senator PASTORE. Well, when you speak about industry, you are actually talking in large part about the networks and, I think, of multiple owners who are in the congested areas; and won't you finally have to cut down on the service areas of their stations? How would you ever reasonably expect these people to make decisions against their own economic interests? The whole thing looks a little bit ridiculous to me. Here you are calling upon a group of people who have a very great economic interest, rightfully so, and they are being called upon to explore the possibilities of something that will be injurious to their stockholders.

Now, how do you expect to get a clear-cut answer, in the public interest, from that kind of a group? People are not ready to commit economic suicide, and I am not advocating here that they should; but have we become so poor as a democracy that we can't, in the public interest, put up our own money to investigate and explore a situation that is in the public interest? Why do we call upon an element of the industry to conduct a study when we know beforehand, or should know beforehand, that it would be against their economic interest to bring in an answer that would be fair to all?

Mr. LEE. I think my enthusiasm for the study at that time was somewhat colored by the fact that largely this same group—103-odd men, I think, mostly technical people—were the same group that developed the color standards, that in effect gave us color. I thought they did a very good job there; and there may be reasons that I don't know of why they didn't do what would satisfy me more in this area.

Senator PASTORE. Developing color standards is an entirely different situation, of course.

Mr. COX. At page 6, you refer to a study of UHF broadcasting which you have had made, and then you present some of the details. I would assume, subject to your confirmation, that this is a study that was conducted by members of the staff of the Commission, under your direction?

Mr. LEE. That is correct.

Mr. COX. Now, the charts and tables which are appended to your report were, then, prepared for you by the Commission's staff?

Mr. LEE. By the Commission's staff, largely under the direction of my engineer, Mr. Weston—some of which, by the way, you saw yesterday. They are the same charts.

Mr. COX. If this is a fair question, could you tell the committee whether the is support among the Commission's engineering staff for your position that the most hopeful prospect for television is a shift to the UHF?

Mr. LEE. Well, I don't think I could speak for the engineers except to say that I have an impression that from a technical standpoint they largely feel that this is the logical thing to do. Now, whether or not they have given enough thought to the disruption, the economic problem, is something I would have to hedge on a little bit.

Mr. COX. I gather from the prepared statement, and what you have said here this morning, that it is your feeling that the propagation characteristics of UHF—which are the one thing in this picture that can't be changed—are not the seriously limiting factors in UHF broadcasting, and that the problem is really one of improving, as you said in 1956, the transmitting and receiving equipment, and that you are confident these problems can be solved?

Mr. LEE. This is my considered judgment based on engineering advice from a variety of sources within the Commission.

Mr. COX. Now, do you believe that these problems—the solution of the development of equipment—would be solved by the manufacturing industry if, and perhaps only if, the Commission were to decide upon and order, after a suitable time, a shift to UHF, backed up by the legislation discussed on Tuesday which would help phase in the new-channel sets?

Mr. LEE. I certainly do, and I say it only from the standpoint of logic, from the pure economic good of the manufacturers, themselves.

Referring to the conversion, I would like to make the point that we did not withdraw the AM band; and if we had gradually withdrawn the AM band, the FM sets would have come quicker. But certainly it is to the economic advantage of the manufacturer, when he gets leadership in this field. Perhaps I should qualify this. It is certainly my impression that what the manufacturing industry in this field needs is some kind of decisive leadership, a firm decision one way or the other. They are big enough to bend whatever way they know it is going to be.

I think part of their problem would be that they would feel "Maybe they don't really mean this." I share the same concern, and I also take full responsibility for my part in being 4 to 3 here and there; and I wish we could be more consistent, perhaps. I certainly point out in my statement, so I don't get in trouble with my colleagues here [laughter], that I certainly respect their views, and I certainly give expert witness to the fact that this has been given a great deal of time and attention on the part of seven men who, unfortunately, come to a variety of conclusions.

Mr. COX. On page 7 of your statement, you refer to a staff memorandum commenting on TASO's critical distance concept. Would you furnish a copy of that for the committee's record, please?—later on; we don't need it right now.

Mr. LEE. All right.

(The document in question is as follows:)

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., May 7, 1959.

Interoffice memorandum.
For: Information.
To: The Commission.
From: Chief Engineer.
Subject: Summary of findings given in final TASO report.

1. The final TASO report has been reviewed for the purpose of summarizing data which may be useful in connection with Commission work on TV allocations problems.

2. The principal value of the TASO report is as a collection of authoritative technical data on characteristics of the respective parts of the TV system; i.e., transmitting equipment, receiving equipment, propagation paths, and human evaluation of the performance associated with various signal and interference characteristics. These technical data are applicable to Commission problems as is illustrated in table A attached to the recent statement to Congress. Reliance was placed upon the TASO report for much of the technical data summarized in table A, as is indicated in its associated "Explanation of TV Planning Items."

3. Introductory sections of the TASO report comprise summaries of findings and analyses prepared by the executive director, Dr. Town, based on the respective panel reports and minutes. This collateral material, while of general interest, has not been subjected to scrutiny by the experts on the respective panels. Accordingly, it is regarded as less authoritative than the panel reports themselves.

4. "Critical Distance":

(*a*) *Explanation.*—In Dr. Town's discussion of panel 3 field tests, he presents a set of scatter diagrams which he derived from panel 3 primary data showing grades of picture quality plotted against distance from the station (figs. 19–1 through 19–4). He then arbitrarily defines "critical distance" as the distance "at which, on the average, service of consistently good quality begins to fall off in the different frequency bands * * * based on currently used effective radiated powers and transmitting antenna heights." From examination of the scattered

points on figures 19–1 through 19–4, he selects values of "critical distances" for the respective bands based on the foregoing definition. He then correlates the "critical distances" he selected with the field strength requirements presented by panel 3 (field tests) and the propagation data in the panel 5 report.

(*b*) *Comment.*—(1) The selection of a "critical distance" from the widely scattered points on the diagrams is largely a matter of individual judgment. Certainly, there is no well-defined transition point.

(2) The definition of "critical distance" selected by Dr. Town is subject to question. Why use "good" as the quality criterion? The distance at which the quality drops below "passable" would be more significant for Commission purposes.

(3) By Dr. Town's definition, "critical distance" is based on "currently used" station powers and antenna heights. It is found, however, from careful study of his discussion that there is a further limitation in that the powers and heights are merely the averages for the stations actually surveyed. To be consistent with Dr. Town's analysis, his definition of critical distance should be modified to read "* * * based on average of effective radiated powers and antenna heights used by the stations surveyed." However, it seems inappropriate and misleading to characterize the respective TV bands in such a definte manner on the basis of such a limited definition.

(*c*) *Conclusions.*—The term "critical distance" as used by Dr. Town represents an attempt to simplify understanding of the service potential of the respective TV bands. It is, however, unsuited as an engineering criterion for evaluating service potential. It is, therefore, concluded that "critical distance" should not be a factor in Commission analyses of TV service potential. The data from which Dr. Town's "critical distances" were derived are, nevertheless, useful to the Commission in evaluating service potential on the basis of more specific and appropriate criteria—as has been done in table A attached to the statement to Congress.

5. The appendix attached hereto summarizes the findings of the respective TASO panels and a compilation of incomplete or additional tasks suggested by the executive director.

6. In summarzing the TASO findings, it is not intended to criticize them (other than as to "critical distance") nor to endorse them. This office is, however, continuing its study of the TASO report and will examine all pertinent TASO data critically before applying it to Commission use. For example, table A attached to the statement to Congress shows results of selection and application of certain data from the TASO report to Commission problems. Additional applications of TASO data will be made as work progresses on specific problems.

E. W. ALLEN, *Chief Engineer.*

APPENDIX

RÉSUMÉ OF TASO FINDINGS

1. TRANSMITTING EQUIPMENT (PANEL 1)

1.1 Standard transmitters

(*a*) *Costs.*—By use of questionnaires, information was obtained on operating costs, plant costs, and current selling prices of transmitters. The data are presented in tabular and chart form in the panel 1 report. For transmitters of the same power rating, costs are generally somewhat higher for UHF than for VHF equipment.

(*b*) *Reliability of performance.*—Reliability in maintaining frequency, power output, and modulation characteristics is found to be generally better at existing VHF stations than at existing UHF stations.

(*c*) *Avenues of needed improvement.*—Need for improved frequency stability of UHF stations is found but modern VHF transmitters were found to have frequency stability adequate for existing requirements. If "precise offset" is adopted for reduction of interference, substantially improved stability will be required for both VHF and UHF operation. Need for longer tube life in UHF applications is noted; also improved stability of tube characteristics over their useful life would be desirable.

(*d*) *Cost and availability of transmitter and monitoring facilities to use precision offset operation.*—If "precise" frequency control is required, the frequency must be held within about 2 or 3 cycles per second of the assigned

frequency. For "very precise" frequency control, the frequency tolerance is about 0.5 to 0.75 cycles per second. Advances in design of quartz crystal frequently control equipment appear to make stability of a few parts in 10^9 obtainable at a cost of about $4,000. With this stability, continuous monitoring would not be required and daily checks against a primary standard would be sufficient. By continuously monitoring the frequency against an atomic frequency standard, stability better than 1 part in 10^9 should be obtainable. Present cost of an atomic standard is estimated at $30,000, with operating cost amounting to about $10,000 per year. Costs per station may decrease if large quantities of such equipment are used. For "precise" offset operation, monitoring by use of standard frequency transmissions (WWV) could be done at equipment cost of $1,000 for low-band VHF stations and $6,000 for high VHF and UHF stations. Equipment for monitoring against VLF standard frequency transmissions (60 kc.) would cost about $7,500. For "very precise" frequency control complete tests have not been made and there are a number of substantial problems which can be resolved only by further tests. (See paragraph 6.3 of this summary for the improvement expected from precision offset.)

1.2 Repeater transmitters

(*a*) *Visual-to-aural power ratio.*—The panel favors a change of this ratio from the present 2/1 to at least 4/1 because experience has shown that such a ratio would be adequate, and in order to effect savings in equipment cost.

(*b*) *Relaxation of vestigial sideband suppression.*—A specification that vestigial sideband suppression be (in db) 10 times the log of the transmitter power in watts divided by 100, not to exceed a maximum of 20 decibels, as recommended by EIA was suggested by the committee.

(*c*) *Mileage and channel separation requirements on UHF (taboos).*—It is suggested that the mileage and channel separation (taboo) tables applicable to full power TV stations in the UHF may be relaxed for UHF translators due to their lower power.

(*d*) *Performance of UHF translator stations.*—The distance to the farthest receiver served by a UHF translator is given as 100 miles, with an average maximum distance of 22 miles, for all stations reporting. Overall performance of receivers on the translator channels was reported to be good, with no major difficulty with drift or tuning. Most receiver troubles were caused by oscillator tube failures. The average cost of a one channel translator installation is about $6,000.

1.3 Antennas

(*a*) *Costs.*—Information on antenna costs and antenna plant cost are presented in charts. Costs are substantially less for UHF than for VHF antennas and antenna plants of comparable height and with ceiling power on VHF and 1,000 kilowatts on UHF.

(*b*) *Structural design of towers.*—Tower design must take into account the expected wind velocities and pressures and the permissible angular deflection of the tower due to wind. It is suggested that towers be designed for a maximum deflection of 0.17° at a wind pressure of 10 pounds per square foot.

1.4 Systems

(*a*) *Visual-to-aural power ratio.*—It is concluded that a change from the present 2/1 ratio to a maximum of 10/1 is practical, advantageous and compatible with existing receiver design.

(*b*) *Precise frequency control.*—Precise offset operation[1] has been shown to reduce cochannel interference and is satisfactory for voluntary use by pairs of stations, both VHF and UHF. Equipment changes would be necessary at stations not equipped with crystal controlled sync generators, special video tape equipment, modern film equipment, etc. Mandatory use of precise offset should be preceded by further investigations of frequency control methods, monitoring procedure, tests on effects of more than one interfering signal and limitations on development of an offset schedule by more than 2 stations in a group. (See par. 6.3.)

(*c*) *Very precise frequency control.*—This[1] has been proposed to overcome the limitation of precise offset to two stations in a group. It requires a tolerance of 0.5 to 1.0 cycles per second. An atomic frequency standard could achieve this accuracy at VHF and would cost about $25,000, with operating and depreciation

[1] See sec. 5.3c for more detailed description.

cost about $6,000 to $7,500 per year. Factory maintenance and repair service would be necessary, involving possible loss of time on the air. Outside frequency monitoring of accuracy at least equal to the station standard would be necessary. In a nationwide plan using this method, each station would have to install the specialized equipment. Inadequate experimental data have been obtained on "very precise" frequency control; tests should be made before further consideration of this technique as an allocation tool. (See par. 6.3.)

2. RECEIVING EQUIPMENT (PANEL 2)

2.1 Receivers

Data on more important characteristics of UHF and VHF receivers were supplied to the panel by 16 receiver manufacturers and 3 tuner manufacturers, covering 78 different receiver chassis and 9 tuners. All VHF receivers had 12-channel tuners, in which channel selection is made by a switch or turret having a detent mechanism and a fine tuning control. Most UHF receivers employ continuous tuning but a few divide the band into segments which are selected by a switch and within each segment the desired channel tuned in by a fine tuning control. All VHF receivers have RF amplifier stages but no UHF receivers have RF amplifier stages. All current UHF receivers have crystal mixers and vacuum tube local oscillators. In combination VHF/UHF receivers, the VHF tuner circuits are usually employed as IF amplifiers for UHF reception, thereby partially compensating for the losses in the UHF tuner. The EIA standard IF of 45.75 megacycles for the video carrier is used in all receivers. Tables of data are given for various aspects of receiver performance. It is found that current UHF receivers suffer in comparison with VHF reecivers in four major respects, (1) noise figure, (2) image ratio, (3) tuner bandwidth, and (4) oscillator stability. The lack of an RF amplifier stage in UHF tuners is reflected in these data. UHF receivers are found to be less susceptible to airplane flutter and to electrical disturbances than are VHF receivers.

2.2 Antennas and transmission lines

Data were obtained from manufacturers of 26 VHF antennas, 4 UHF antennas, and from 3 manufacturers of transmission lines. The data show the average gain of current UHF antennas is greater than that of VHF antennas but the increased gain at UHF is insufficient to maintain the same effective area as for VHF antennas. Consequently, the signal voltage delivered by the antenna to the transmission line is less than at VHF, for equal field strengths. Transmission line losses are substantially greater at UHF than at VHF, and are greater for old, wet line than for new dry line. Consequently, the signal power delivered by the transmission line to the receiver will be further reduced at UHF, relative to VHF. The total difference amounts to from 10 to 13 db at the receiver for equal field strengths at high VHF and UHF. Detailed tables of characteristics are given.

2.3 Electron devices for TV tuners

It is found that the most important characteristics of electron devices for TV tuners are (1) noise figure, (2) amplification, and (3) oscillator stability. The best VHF noise figures are found to be about 2 db above the theoretical limit while the average values are about 4 db above this limit. If RF amplifier stages were use in UHF tuners, an improvement of about 2.5–5.5 db may result. No findings were made concerning the possibility of improved performance by use of parametric amplifiers.

2.4 Community antennas and distribution systems

Of 125 CATV systems reporting, 24 receive UHF signals from 59 stations and use the signals from 17 of these stations. Reception distance ranged from 15–115 miles, with 80 percent of the signals being received from 65 miles or less. All 125 CATV systems reported receiving VHF signals from 360 stations at 15–175 miles, with 75 percent of the signals being received from 125 miles or less.

2.5 Effects of sound power reduction

Tests were made on representative receivers to determine effects of sound power reduction on performance. It is found that the results would be generally adverse and that any reduction of sound power would be detrimental to a significant number of receiver users.

3. FIELD TESTS (PANEL 3)

3.1 Picture quality versus field strength tests

Field surveys were made by teams of engineers in 11 general areas located throughout the country. The teams visited homes in each area to observe the quality of the received picture, to measure the field strength of the stations received just outside each home, and to obtain the householder's rating of the picture quality. The resulting data are plotted in graphs showing picture quality versus field strength. Field strengths adequate for reception at 30 feet height are tabulated below:

	Good picture	Passable picture
Low VHF	50 dbu	40–45 dbu
High VHF	60	50–55
Low UHF	65	55–60
Middle and high UHF	72	62–67

It was noted that as the distance from the transmitter increased the average quality of the antenna installation improved and the average service condition of the receiver improved.

3.2 Tests of reduced aural/visual power ratio

Tests were carried out by having three stations operate with occasional changes in their sound power to one-half, one-fifth, or one-tenth during a 1-month period. Questionnaires returned by TV servicemen were analyzed to determine the effects of sound power reduction at various distances. The analysis indicates no degradation of sound coverage, except possibly beyond 100 miles where the data is insufficient to be conclusive.

3.3 Servicemen's questionnaire results

Questionnaires returned by 730 servicemen were analyzed and the results tabulated in the panel 3 report. These data show, in general, the opinions of the respondents as to the proportions of various kinds of receiving equipment, the various kinds of reception difficulties encountered, and various aspects of performance of receiving installations. These data are so detailed and comprehensive that they are not amenable to concise summary.

4. PROPAGATION DATA (PANEL 4)

4.1 Measurement of service fields

Specifications for measuring srevice fields are stipulated. Such standardization will provide data which are readily comparable and which may be analyzed in connection with either scientific studies or station coverage showings. In conformance with these specifications, eight comprehensive measurement surveys were conducted by the Association of Maximum Service Telecasters showing the service coverage of both VHF and UHF in different areas and the data collected was submitted by TASO. These data are being used both by the Commission's staff and TASO in a continuing study of service field prediction methods.

4.2 Measurement of interfering fields

Analysis of a vast quantity of data was completed and a set of field strength curves based on this analysis was submitted by TASO. These curves depict median field strength variation with distance for frequencies between 40 and 1,000 megacycles, together with related time variability factors. The curves were derived by determining the best fit to data collected for overland U.S. paths only.

The analysis of the data was conducted at the Boulder Laboratories of the National Bureau of Standards and the staff at this laboratory suggested a method for calculating tropospheric fields. This method, even for a single path, involves laborious calculations and a knowledge of several parameters not always readily available.

4.3 Review of existing records of service fields

A catalog was compiled which lists field strength surveys made prior to the formation of TASO.

4.4 New factors

By their nature, investigations of new factors do not lend themselves to quick solution. In general, it was found that more time was needed to complete studies dealing with sporadic E propagation, the 2- to 10-mile rule, circular and cross polarization, multicasting, clutter effect of foilage, etc.

5. ANALYSIS AND THEORY (PANEL 5)

5.1 Systems concept

The systems concept discussed by panel 5 integrates the several parts of the TV broadcast system involved in the transmission of the program from the studio to the viewer's eye. These parts are (1) transmitter, (2) transmitting antenna, (3) propagation, (4) receiving antenna, (5) receiver, and (6) the human reaction of the viewer. The objective of panel 5 was to analyze data on the foregoing system parts developed by the other panels and to furnish, where possible, theoretical explanations of the resulting standards of satisfactory service. (The systems concept discussed by panel 5 is essentially the same concept used heretofore by the Commission to develop TV allocations rules and standards.)

5.2 Allocation principles

The panel suggests that service area limits be specified in terms of location probability, computed from field strength, interference ratio, fading, and for specified values of time and location percentages. The selection of the specific values of field strength, interference ratios, and other factors are left to the judgment of the FCC. (The allocations concept of panel 5 is essentially the same as developed by the Ad Hoc Committee and used heretofore by the Commission.)

5.3 Allocation aids

Discussion of posible modification of existing FCC technical standards is presented as follows:

(*a*) *Visual-to-aural power ratio.*—The lack of unanimity in TASO on this factor is summarized by panels:

Panel 1: Favors a change from the present 2 to 1 to at least 4 to 1 to reduce transmitting equipment cost.

Panel 2: Opposes any change because of possible impairment of sound signal in fringe areas and in presence of impulse noise.

Panel 3: Made field tests which showed little degradation of sound signal out to 100 miles. There is some question as to the significance of the tests because of the small sample size.

Panel 5: Reported from a survey of literature that monochrome receivers can tolerate interference from the upper adjacent channel better than from the lower, by about 5 to 7 db.

Panel 6: Reported that adjacent channel interference ratios were about the same for upper and lower adjacent channels, with a 2 to 1 visual-to-aural power ratio.

(*b*) *Directional antennas.*—It is stated that judicious use of directional transmitting antennas could provide a valuable allocation tool, but that field tests are needed to determine necessary limitations on their use.

(*c*) *Precise and very precise frequency control.*—For a system of precise offset operation when a lattice of more than three stations is considered, any additional stations would necessarily be operating close to the same frequency as one of the first three stations. Although the geographical separation between the fourth station and its counterpart in the triangle of the first three stations would be greater than the separation between the first three stations, operating at 10 or 20 kc precision offset, the fourth station becomes the dominant source of interference. It is suggested that a system of "very precise" offset operation with the frequencies of the "second ring" stations offset by values of a few hundred cycles, from those of the first ring with a tolerance of ±c.p.s., might reduce the interference effect. Further laboratory and field tests are needed to determine the practicability and the nature and extent of the improvement to be expected. (See par. 6.3.)

(*d*) *Cross and circular polarization.*—Cross polarization was considered as a means of reducing interference between stations. Circular polarization was considered as a technique for enhancing signals in shadow and built-up areas, particularly at UHF. It is suggested that these techniques should await further investigation before being considered in connection with allocation.

5.4 Portrayal of television coverage

It is suggested that coverage of a TV station should be portrayed in the form of equiservice contours on a map of the area surrounding the station. It is proposed that the FCC designate certain of these contours as limits of grades of service, such as "Principal city," "Urban," and "Rural." (This method is essentially the same as has been customarily used in the Commission for portraying coverage.)

5.5 Empirical prediction of field strength

Methods of predicting field strength are being developed by Dr. LaGrone from analysis of data collected by panel 4. Work on this analysis is incomplete.

5.6 Unfinished work of panel 5

Completion of the work on field strength prediction by Dr. LaGrone is estimated to require about 1 year and cost about $30,000. Further work is desired on the selection of "critical numbers" from the TASO data.

6. SUBJECTIVE LEVELS OF PICTURE QUALITY (PANEL 6)

6.1 Grades of picture quality

The panel established six grades of picture quality defined as follows in terms of the subjective effect on the viewer:

Grade	Name	Description
1	Excellent	The picture is of extremely high quality, as good as you could desire.
2	Fine	The picture is of high quality providing enjoyable viewing. Interference is perceptible.
3	Passable	The picture is of acceptable quality. Interference is not objectionable.
4	Marginal	The picture is poor in quality and you wish you could improve it. Definitely objectionable interference is present.
5	Inferior	The picture is very poor but you could watch it. Definitely objectionable interference is present.
6	Unusable	The picture is so bad that you could not watch it.

6.2 Adjacent channel interference

The required signal-to-interference ratios were found to be, for 50 percent of observers, as follows:

Grade of picture quality	Interference from—	
	Upper adjacent channel	Lower adjacent channel
	Decibels	*Decibels*
2	−22	−22
3	−27	−27
4	−31	−32

These results were obtained by use of many observers and five different good commercial receiver models with sound power 3 decibels below visual. Tests made with sound power reduced to 10 decibels below visual gave 3 decibels less interfering effect in color receivers and 8 decibels less interfering effect in monochrome receivers, for lower adjacent channel interference.

6.3 Cochannel interference

Extensive tests were made on cochannel interference with various values of offset frequencies corresponding to normal, precise, and very precise offset. Analysis of the data gives the following ratios:

Grade of picture quality	Desired-undesired ratio		
	Normal	Precise	Very precise
	Decibels	*Decibels*	*Decibels*
2	36	27	26
3	27	21	22
4	20	16	20

[1] 360 cycles per second.

6.4 Random noise interference

Subjective tests with random noise interference show the following required ratios:

[Sync peak-root mean square noise ratio]

Grade of picture quality:	*Decibels*
2	36
3	27
4	23

7. UNFINISHED TASKS AND OTHER NEEDED WORK

7.1 Unfinished tasks

(*a*) Further work on directional antennas is planned and tests are now in progress.

(*b*) The influence of receiving antenna surroundings, such as woods, is being given further study by AMST.

(*c*) Tests of alternate channel operation in the UHF band is planned by Adler Electronics, Inc.

(*d*) Tests of on-channel boosters will be continued by Adler Electronics.

(*e*) Studies have been made by CBS on the use of three low-power UHF transmitters to cover a rough area, and analysis of the tests is being made by the Bureau of Standards.

(*f*) Work has been started by CBS and NBS on effect of a city or village on field strength.

(*g*) Panel 5—Analysis and theory will continue its work on synthesis of TV system characteristics from its review of the work of the other TASO groups.

7.2 Other needed work

Additional work is suggested by Dr. Town, as follows:

(*a*) Completion of work started on analysis of the propagation data, particularly with a view to establishing valid methods of predicting field strength.

(*b*) A study to determine areas in which UHF television can provide good service from a technical viewpoint.

(*c*) Field tests to determine the practicability of very precise carrier frequency control, in accordance with specifications developed by TASO for conducting such tests.

(*d*) Development of simplified methods of adequate accuracy for defining, predicting, depicting, and measuring station coverage.

(*e*) To obtain a quantitative idea of the field strength required to provide both VHF and UHF service in very large metropolitan areas, it is suggested that means for making field-strength measurements in such areas be developed and that a large amount of field work be devoted to field-strength measurements and observations of picture quality in homes.

(*f*) Quantitative data are needed on the nature and magnitude of noise throughout the VHF and UHF spectra. This calls for development of measuring methods and extensive surveys in urban, rural, and residential areas. Studies of receiver radiation and galactic noise should be included.

(*g*) Field tests of circular, vertical, and horizontal polarization are needed.
(*h*) Additional information is needed on the height-gain relationship of transmitting and receiving antennas as related to environment.
(*i*) Techniques should be developed for actual measurement of the true effective radiated power under operating conditions.
(*j*) Studies to determine presence of and to evaluate any special problems characteristic of color TV which may affect allocations.

Mr. Cox. Further on in your statement, you discuss three attachments to your statement which show field intensity measurements made, as I understand it, by TASO over three types of terrain. Now, these are the same three that were presented by Mr. Cowperthwait, on Tuesday, except that you injected a second, and lower, signal level for UHF, based on an improved receiver?

Mr. LEE. Yes, this is based on the development of the parametric amplifier, tunnel diodes—don't ask me what a diode is, though. [Laughter.]

Mr. Cox. What are the prospects, based upon the advice you have received, of the development of such a receiver, which as I understand it would have something on the order of 10 db less internal noise than the present receivers available—how good are the chances that, given proper incentives, the industry could produce a set with this much of a reduced noise factor?

Mr. LEE. With incentive, there is no question in my mind. If there is an expectation, a firm expectation of a market, I think it is that simple—they will make it.

Mr. Cox. You then attach to your statement a table designed to compare the service capabilities of the various systems which were under consideration. This starts off at the top line with a statement as to the maximum number of stations which could be used under these various systems. As I understand it, you have simply taken the number of channels under consideration and multiplied them by 50, on the assumption that you can, on a reasonable lattice, get that many stations operative on a given channel?

Mr. LEE. This is purely a mathematical extension, not necessarily practical, to illustrate the difference between 12 channels and 70.

Mr. Cox. Now, I notice that though the Commission has generally assigned approximately 50 stations on VHF channels, it has not made nearly that many assignments on UHF channels. Was this for engineering reasons, or simply because they didn't need to make those allocations?

Mr. LEE. I wonder if I could turn that over to Mr. Weston.

Mr. WESTON. I am Robert G. Weston, engineering assistant to Commissioner Lee. I prepared the table to which you make reference. The numbers that you see as the numbers of stations per channel are those contemplating complete saturation of the channels. It doesn't necessarily mean that we have this number of UHF stations.

Mr. Cox. You make no comment on the economic feasibility?

Mr. WESTON. This is the technical feasibility. Since the cochannel spacings on UHF channels are somewhat less than on V, there it is conceivable that you could, technically, put a slightly greater number of stations on each of the UHF channels; but the number is not significantly greater, and therefore we use 50 per channel as a fair representation. I think some of the V channels presently have 50 stations.

Mr. Cox. The fact upon which I commented, that the present use of UHF is not nearly that saturated, is not because of any engineering limitations?

Mr. LEE. No, indeed.

Mr. Cox. Now, from this table you conclude that it is technically feasible to supply all portions of the country with a number of services, with a 70-channel UHF system. However, I take it that this, of course, is based on the assumption that stations would be built where none now exist?

Mr. LEE. That is correct.

Mr. Cox. In other words, in line with the questions of Senator Pastore, earlier, assuming that you can, through a gradual process, get into the hands of the public, at perhaps slightly increased expense to them, replacement sets which have a UHF capability, you still have the problem that when the present broadcaster turns off his VHF transmitter and relies solely on his UHF transmitter, that even with the foreseeable improvements in transmitting and receiving equipment, they may be, then, a withdrawal of the maximum range of his signal; is that the case?

Mr. LEE. Yes, I believe that is a fair statement.

Mr. Cox. Then the problem is whether either by that time, or promptly upon the occurrence of that event, there would be economic support, in the vicinities left without this coverage, for the development of new UHF stations when they could come on the air with sets already in existence, capable of receiving their signal, so that they are not faced, as were the original UHF pioneers, with an incompatibility problem?

Mr. LEE. I think you would be hard pressed to find many communities in this country who are not growing very rapidly. I tried to point out, I might agree and say a very good argument could be made for a rather adequate television service right now. I am more concerned with the future. In the past decade, Bud here just told me, 41 million people were born, and there are going to be a lot more people, and a lot more sets.

Senator PASTORE. Well, let's get it in the record at this point: How many people in the country would you say have the availability of at least one station, or one channel?

Mr. LEE. We have those figures. I don't think I could give them to you off the cuff. This is Mr. Hy Goldin, our chief economist.

Mr. GOLDIN. On the basis of surveys made by various groups, it is estimated that practically all families are within service range of at least one signal. There is also an estimate that 81 percent of all families are within service range of at least four signals at the present time, and there is also an estimate that approximately between 88 and 90 percent of all families are within service range of at least three signals.

Mr. Cox. When you say they are within range, this means they can get it if they are willing to spend more than average sums for antennas, or that they are within the computed coverage of these stations?

Mr. GOLDIN. This is not—this measurement is not on the basis of the Commission's A or B contours. It is on the basis of what other people in the same county have. In other words, if at least 10 percent of the county are now having television receivers and listening to three signals, this assumes the rest of the county have it.

Senator PASTORE. Does this include——

Mr. GOLDIN. This figure is without regard to whether it is CATV. Because of the concentrations in the great metropolitan centers, the variation that occurs because of satellite service or service other than normal broadcasting is statistically relatively small.

Mr. COX. Translators, boosters?

Mr. GOLDIN. But again that makes statistically small difference.

Senator PASTORE. Now, let me review those figures. One hundred percent has at least one, right?

Mr. GOLDIN. 99 to 100.

Senator PASTORE. 81 percent has four services?

Mr. GOLDIN. Four or more; and approximately between 88 and 90 percent, probably, have three signals.

Mr. LEE. When you are speaking in terms of coverage, you are talking in terms of the purely VHF stations with large coverage. One way to improve it immediately would be to permit more local outlets to communities. We all hear this complaint—we heard it from Congressman Ayres, that he has to go to Cleveland to reach his people, and he is paying for 2 million people who can't vote for him. But more importantly, UHF can provide for expansion in the future; but I do not think that is inherent at all in the existing structure.

Mr. COX. It would provide, for instance, even in larger communities, the possibility of a station, perhaps a network of stations, providing a different program concept, one perhaps designed to appeal to different groups in the populace than the present national services?

Mr. LEE. Yes, it would have all the advantages of more competition, and would certainly solve the educational problem.

Mr. COX. In other words, good as the service that Mr. Goldin has outlined may be in terms of the availability of some service, it represents, at present, the ceiling. That is, in other words, the 88 to 90 percent who have three signals have, under present arrangements, no chance, substantially—many of them—of ever getting a fourth or fifth, or ever getting a local station which will provide local support for their current endeavors?

Mr. LEE. I believe that is quite accurate, yes.

Mr. COX. Now, you stated at page 12 in your prepared statement that two of the VHF stations in Albany were still operating their UHF transmitters to augment their service because of difficulties with the V transmission. Is this still true a year later?

Mr. LEE. Yes, that is typical of a problem, for example, in Providence, if I may mention it, where if you try to get a station in under existing separations, what you are doing is giving something less than is adequate, and certainly not comparable or competitive to the stations within the area.

It is so far out that the signal is inadequate; and in this case in Albany, after trying very hard to get this V dropped in, which we finally did at Vail Mills, their coverage in the community was so poor they asked permission from us to operate the UHF station as well as the V, which we permitted; and they presently are experimenting with what they call a satellite station to improve this coverage in the metropolitan area. I am not conversant with the latest results of that, but it is going on.

Mr. Cox. That is, they operate their VHF transmitter in Vail Mills and operate a UHF transmitter at some other place which provides supplemental coverage in the principal cities?

Mr. LEE. Right.

Senator PASTORE. Do they have concurrent coverage?

Mr. LEE. It is the same program.

Mr. Cox. This involves, then, a waiver of the Commission's duopoly rule?

Mr. LEE. That is right.

Senator PASTORE. I was thinking of it in terms of the suggestion made the other day of concurrent transmission of UHF and VHF, if that wouldn't be a good proving ground to find out how it works. That is how I was thinking on that. You already have a setup right there, where they are sending it out on both frequencies.

Mr. LEE. In effect they are doing that. It lacks one important element, and that is the fact that as of "X" date they will not receive the VHF; so I think the stimulus to convert to a UHF set is not there, but the other part of the plan is a perfect example.

Senator PASTORE. I missed that a little bit.

Mr. LEE. What we have in Albany is some kind of a temporary expedient to provide the principal-city coverage over Albany by the use of a UHF until such time as they can engineeringlywise work out something that will permit it to be done for the V. So I do not think that the people in the area are under any kind of compulsion to know, when they go to the store to replace the set as they ordinarily would, anyway, that they should be insistent on one that would receive both. I think they probably have the impression that the U is on the way out rather than the V.

Senator PASTORE. You are talking about impressions. What are the facts? Will the U or the V go?

Mr. LEE. If the results of the booster experiment are successful, I assume the U would go.

Mr. Cox. Now, you attach, also, a memorandum from the chief engineer regarding comparative coverage of metropolitan areas, such as New York City, showing that in his opinion the UHF frequencies should theoretically, at least, be able to service such areas as adequately as the lower VHF frequencies. Now, is the test in New York, which is to be financed with this $2¼ million appropriation you are requesting, designed to verify or to check on the accuracy of these predictions?

Mr. LEE. Yes. The strange characteristic is that the UHF band actually is superior to the VHF band with respect to manmade noise. I know some of the engineers will cringe when I say this, but I liken it somewhat to the superiority of the FM over the AM at close range. The UHF band is not as susceptible to noise, so that close in, actually, it should be superior.

Mr. Cox. The tables in this memorandum indicate that, at least on indoor antennas, UHF may actually have some superiority. Is this a significant factor; is it the case in New York that many homes are equipped only with indoor antennas?

Mr. LEE. I would assume a great many of them are equipped through apartment houses, with one antenna and lead-ins to their set, which would be significant, as I understand it, yes.

Senator PASTORE. If I may interrupt at this point, don't you think it would be advisable, Mr. Lee, at this point to clear the record, or for the purpose of the record, why this enterprise, or this experimentation, has to be undertaken in New York, when you already have a very fair example up in Albany? Why do you have to go to New York at all and spend money when you have an actual setup in Albany? Someone is going to raise that question, and you must have your reasons for it, and you should put them on the record.

Mr. LEE. Yes, I think we have a very good answer, and I would like Commissioner Craven to give it.

Senator PASTORE. All right, I think it ought to be in the record.

Mr. CRAVEN. Mr. Chairman, New York City, by reason of its high buildings and multiple reflections and the necessity of having apartment houses with single antennas, presents quite a different problem than Albany. Likewise, there are a lot of other stations in New York. If you locate your transmitter on top of the Empire State, which is the proper place to locate a VHF transmitter, you may have hundreds of thousands of people without service because the UHF will not bounce back and fill in the caverns.

Second, from the Empire State Building into New Jersey, you have the Palisades; and it is possible that with a single source, such as Empire State, you will not be able to have coverage in parts of the metropolitan area of New York which lie in New Jersey.

Now, up in Albany, we already know a great deal. Personally, I know something about Albany. Prior to coming back on the Commission, I was a consulting engineer for one of the UHF stations in Albany, and I was able to make comparisons between VHF and UHF—General Electric Co.'s channel 6, I believe, as compared to the UHF channel—and there was a distinct and sharp difference in coverage between VHF and UHF. UHF is far inferior so far as reaching the mountainous region to the north is concerned. There, there were only one VHF station and two UHF stations, as I recall, so the economic factor was not as great as where the situation is reversed, where there is only one UHF station.

I think that we have enough information concerning Albany, where we do not have very much information concerning New York City; and it is New York City, in my mind, where millions of people are concerned where UHF has to demonstrate itself before I would be willing to say to go to UHF right away.

Mr. COX. You mentioned, Commissioner Lee, that in effect, under contract, the Commission is going to build a UHF station and operate it. Is it also going to be involved in the effort to develop at least sample sets of an improved character which will be spotted throughout the community for measuring purposes?

Mr. LEE. Yes, and I might add in further reference to Commissioner Craven's statement that in essence we have deliberately picked the worst area in the world to see what UHF can do. If it doesn't work in New York—and I am confident that it will—I will probably throw in the sponge.

I think that all indications that we have from our engineering people—and, of course, they will give you all the detail you need—is that it will work, and probably surprisingly well.

We plan, as I recall the figures, to install roughly 100 receiving sets, which will be of superior design. This will be in consultation with manufacturers at strategic points. We will put them in homes, and whoever we contract with will visit the homes at intervals, look at the pictures, service the sets, and develop this data that will answer many questions for a long time to come.

Mr. Cox. You also refer, on page 13, to the report on multicasting which you called to the committee's attention, I believe, in 1958. Would you supply a copy of that for the record at this point?

Mr. LEE. Yes.

(The report is as follows:)

FEDERAL COMMUNICATIONS COMMISSION,
OFFICE OF CHIEF ENGINEER,
TECHNICAL RESEARCH DIVISION,
Washington, D.C., February 4, 1958.

[T.R.R. Rept. 5.1.1]

A PRELIMINARY ANALYSIS OF MULTICASTING

(By E. W. Allen, Harry Fine, and Jack Damelin)

Experience within the last few years with the difficulties encountered in providing UHF television broadcast service in rough terrain from a single transmitter has led to investigation of possible new approaches to the provision of this service.

One technique which shows some promise is multicasting. This name has been adopted to describe the technique of providing a single service to an area by means of several transmitters on different frequencies and at different locations. This is a variation of the polycasting technique, suggested by R. M. Wilmotte several years ago, wherein several transmitters would operate on the same frequency within a given service area. The fundamental concept remains the same; namely, that better and more uniform coverage can be had by directing radio energy into an area from several directions rather than from a single radiating source. In this report, a preliminay study is made to evaluate the advantages of multicasting.

Figure 1 shows the probability that at least one of the fields received from two radiating UHF systems with the same median value of field strength exceeds various levels of amplitude, referred to the median value of field strength, obtained from a single UHF station having the same total radiated power. It is further assumed that the slope of the distribution of signal strengths is the same for each UHF station, the median of the single high power station being 3 decibels higher than the median of each of the multicasting stations. The values are for rough terrain and separate curves are shown for different coefficients of correlation between the terrain distributions of the fields from the two stations. The correlation coefficient is a measure of the tendency of both the received UHF signals to have the same value at the some location. Thus, with negative correlation, if one of them is strong, it is probable that the other will be weak; and, vice versa, if one of them is weak, the expectation is that the other will be strong. A minus one correlation coefficient means that the relationship is exact, when one of the received signals is strong the other will be weak and vice versa. Zero correlation denotes that the strength of one of the signals gives no indication as to what the other might be. Under practical conditions, it should be possible usually to obtain an appreciable negative

correlation by judicious placement of the transmitters. Thus, in a built-up area with the streets running parallel or perpendicular to each other, a fairly high negative correlation should be achieved by beaming the power into the area from two quadrature directions. For comparison, the distribution with location is shown for a single UHF station radiating the same total power into the same area. Likewise, the location distribution is shown for a single VHF station in the same area and with the same median signal level as the single high power UHF station. As expected, the slope for the VHF location distribution is flatter than that for the UHF. In other words, the terrain looks less rugged for VHF than for UHF. These location distributions are approximately the same as those shown for the west radial of the RCA-New York City survey.[1]

With the above assumptions, it is noted that below the median level, the VHF fields show an increasing advantage over fields from the single UHF station when both have the same median value, this advantage being 9 db at the 99 percent level. But for two UHF stations multicasting with the same total power as the single UHF station, this discrepancy has been more than overcome because of the space diversity filling in the shadow areas. The relative level is always greater than that for fields from the single VHF station, the advantage increasing with increasing negative correlation. Further, it is noted that the greatest improvement in UHF service is obtained at the weak signal locations where it is needed most.

We are talking about the variation of fields from location to location in relation to the median field. The technique of multicasting at UHF decreases the range of this variation, but does not overcome the requirement for a higher field strength at a UHF receiving antenna than at a VHF receiving antenna for satisfactory service. Thus, the required median UHF field and the total UHF power is still likely to be greater than for VHF for a comparable service to a large percentage of receiver locations.

Figure 2 shows a similar set of curves for smooth terrain, giving the improvement which can be attained by multicasting over terrain similar to that of the RCA-New York City southwest radial.[1] Because of the much flatter terrain distributions (denoting much smoother terrain) the difference between the distributions of the VHF and the UHF fields is only 3 db at the 99 percent level. Again the distributions for two multicasting stations show to advantage over the single UHF and VHF distributions, although the improvement is not as marked as for the rough terrain of figure 1.

The improvements with zero correlation but with different numbers of multicasting stations are shown in figure 3 and figure 4 for rough terrain and smooth terrain, respectively. As expected, additional improvement in coverage may be obtained by the use of more multicasting stations to increase the diversity effect, but the improvement per station decreases as more stations are used. By comparison with figures 1 and 2, it is noted that relatively greater improvement can be obtained by locating the stations to achieve a relatively high degree of negative correlation than by increasing the number of stations.

The foregoing results, which indicate that two or more UHF transmitters of like power and judiciously placed will provide a better service than a single transmitter of the same total power, are not surprising. However, the question arises at once as to whether such an approach would be consistent with efficient spectrum usage. Although no exhaustive quantitative analysis has been completed at this time, a preliminary study indicates that there are countervailing effects which offset the use of several channels in a single service area.

---

[1] G. H. Brown, J. Epstein, and D. W. Peterson, "Comparative Propagation Measurements; Television Transmitters at 67.25, 288, 510, and 910 Megacycles," RCA Review, vol. IX, p. 177, June 1948.

An example was studied in which three UHF transmitters were located at the corners of an equilateral triangle 25 miles on a side, each transmitter being 14.5 miles from the center of the area to be served. The antenna heights were chosen as 500 feet to decrease cost and airspace problems. The transmitter powers were each 20 kilowatt effective (13 dbk). These transmitters were assumed to be located in rough terrain and in a congested area such that they were surrounded by cochannel transmitters at a minimum permitted spacing of 50 miles. It was further assumed that precision offset, requiring a 20 db signal to interference ratio for acceptable service, and directional receiving antennas with a 10 db front to back ratio were used. Zero correlation between the fields from the three transmitters was assumed.

With these assumptions, it was found that a 50-mile cochannel transmitter spacing permitted a 90 percent location (principal city grade) service to somewhat in excess of all of the area enclosed within the 25-mile triangle, with a radius of from 9 to 15 miles from the center of the area. The grade A (70 percent) service radius varied from 19 to 27 miles and the grade B (50 percent) service radius from 23 to 30 miles. Thus, the three-frequency operation provided grade A service or better to an area of 1,060 square miles. To cover this area with a single transmitter having the same total power, other assumptions being equal, a cochannel spacing of 100 miles would be required. Thus, within a given large area four times as many multicasting stations (spaced at 50 miles) than single stations (spaced at 100 miles) could be assigned on each channel. Thus, although the multicasting example requires three channels per service for its operation, a given number of channels would provide 4/3 as many equivalent service areas in a given large area. Further, the advantage of multicasting efficiency increases substantially when the transmitter sites are selected for a maximum fill-in of each others' shadow area, i.e., designing for the maximum negative correlation.

In the foregoing example, comparisons have been made between the coverage of single stations with cochannel separations of 100 miles and multicasting stations with cochannel spacings of 50 miles. Spacings shorter than those provided in our rules have been used, as it has been found from our studies of UHF coverage that more effective channel usage can be made at shorter spacings, when dealing with rough terrain. It is assumed that cochannel ratios of 20 db will apply to the first ring and 28 db will apply to the second ring of cochannel stations surrounding the desired station with receiving antennas having a 10 db front to back ratio. Such an allocation presumes the use of precision offset and synchronous operation between cochannel transmitters. It is believed that the state of the art is such that such frequency stability may either be attained now or in the not too distant future.

While the relative coverage efficiencies of the single channel and the multicasting approaches will vary with changes in the assumptions which are made in each case, it does not appear that the multicasting efficiency will be out of line with the results of single station coverage. The studies are being continued, and it should be possible to give more reliable estimates of channel coverage efficiency at a later date. One aspect which seems certain is that the larger areas can be served by multicasting with lower antenna heights and lesser powers than by a single station. An economic advantage over polycasting is that, in each group of transmitters, all but one could operate as a translator from the master transmitter and no microwave links or wire lines would be required between them.

However, in order to take advantage of multicasting and to keep the channel efficiency high in congested areas so as to meet the probable demand for service, UHF–TV receivers must be improved to the point where the FCC table of "Taboos," involving the additional station assignment limitations, can be greatly reduced or abolished.

FIG. 1

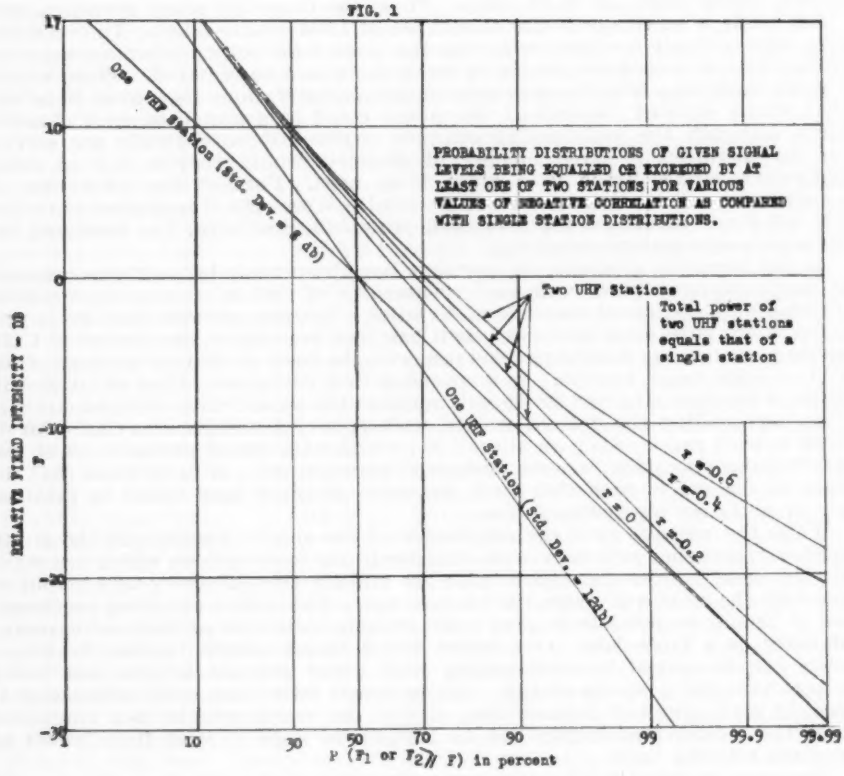

PROBABILITY DISTRIBUTIONS OF GIVEN SIGNAL LEVELS BEING EQUALLED OR EXCEEDED BY AT LEAST ONE OF TWO STATIONS FOR VARIOUS VALUES OF NEGATIVE CORRELATION AS COMPARED WITH SINGLE STATION DISTRIBUTIONS.
Two UHF Stations
Total power of two UHF stations equals that of a single station
One VHF Station (Std. Dev. = 8 db)
One VHF Station (Std. Dev. = 12db)
r = -0.6
r = -0.4
r = 0
r = +0.2
RELATIVE FIELD INTENSITY - DB F
P (F1 or F2 ≥ F) in percent
17
10
0
-10
-20
-30
1
10
30
50
70
90
99
99.9
99.99

FIG. 2

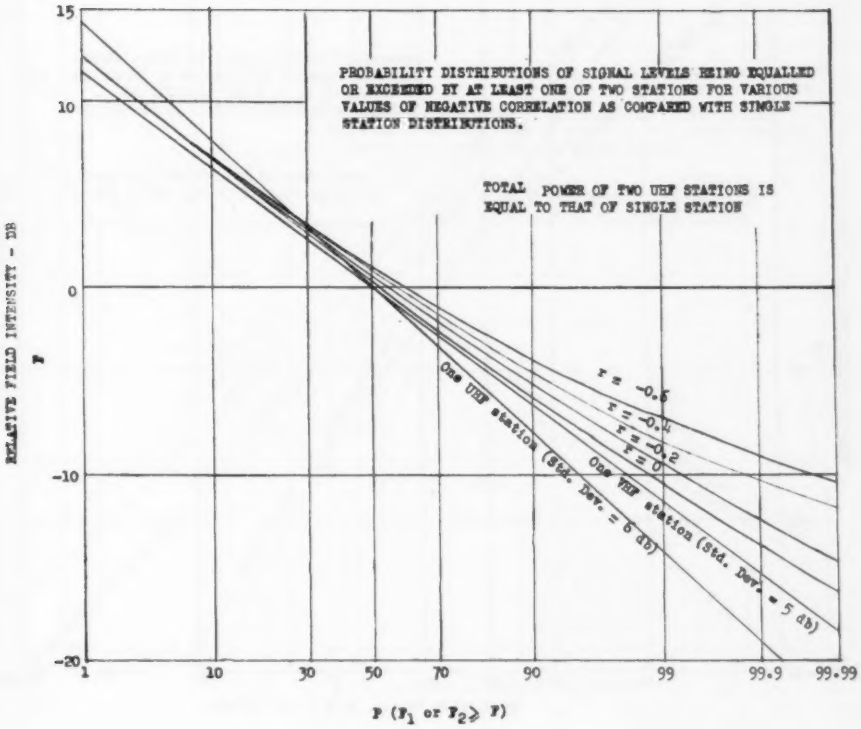

PROBABILITY DISTRIBUTIONS OF SIGNAL LEVELS BEING EQUALLED OR EXCEEDED BY AT LEAST ONE OF TWO STATIONS FOR VARIOUS VALUES OF NEGATIVE CORRELATION AS COMPARED WITH SINGLE STATION DISTRIBUTIONS.
TOTAL POWER OF TWO UHF STATIONS IS EQUAL TO THAT OF SINGLE STATION
RELATIVE FIELD INTENSITY - DB
F
15
10
0
-10
-20
1
10
30
50
70
90
99
99.9
99.99
P (F1 or F2 ≥ F)
r = -0.6
r = -0.4
r = -0.2
r = 0
One UHF station (Std. Dev. = 6 db)
One VHF station (Std. Dev. = 5 db)

FIG. 3

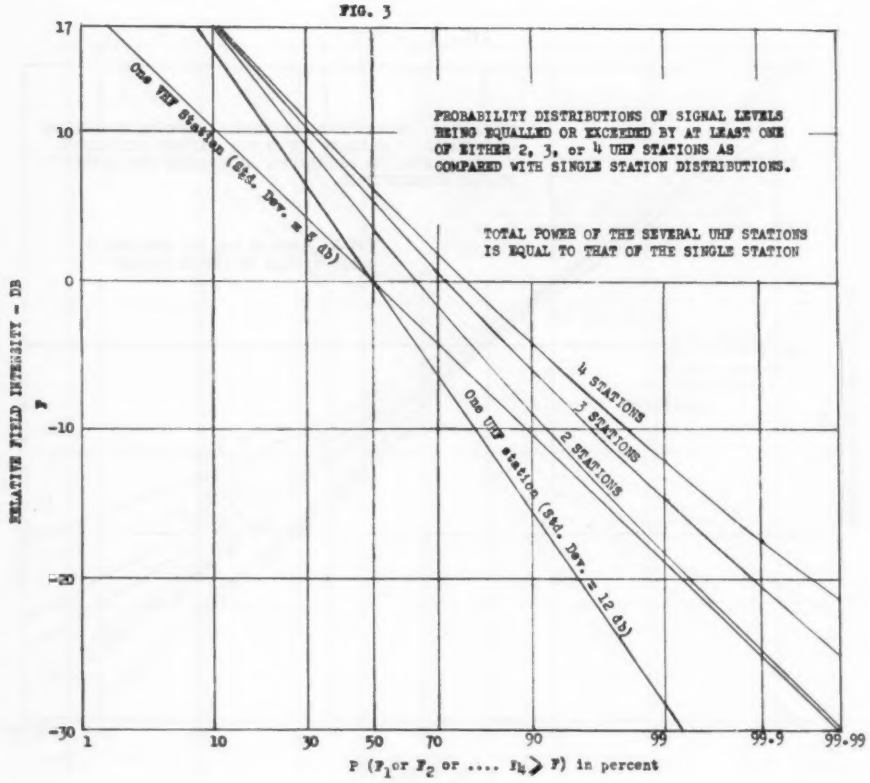
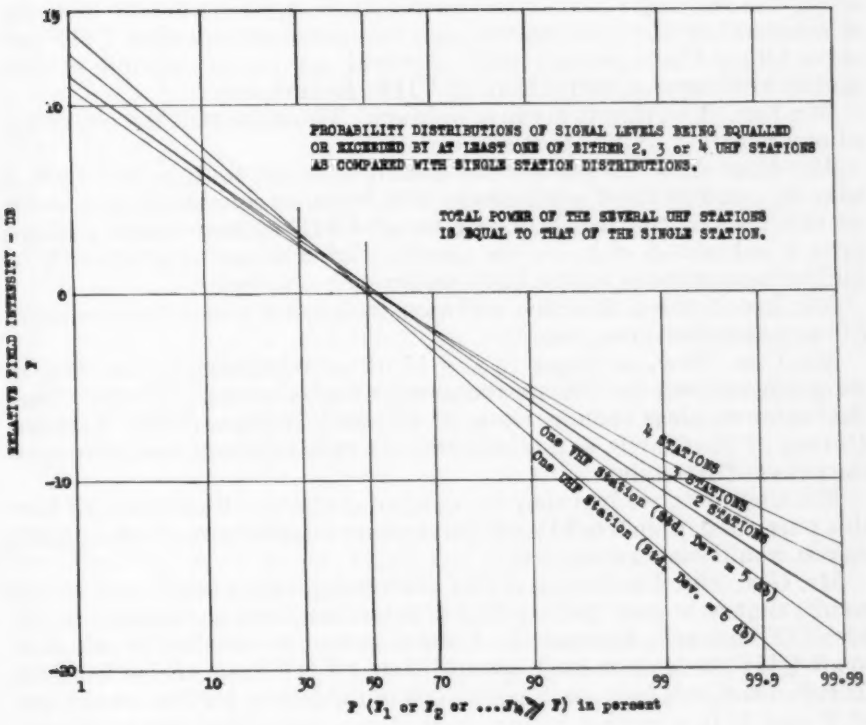

PROBABILITY DISTRIBUTIONS OF SIGNAL LEVELS BEING EQUALLED OR EXCEEDED BY AT LEAST ONE OF EITHER 2, 3, or 4 UHF STATIONS AS COMPARED WITH SINGLE STATION DISTRIBUTIONS.
TOTAL POWER OF THE SEVERAL UHF STATIONS IS EQUAL TO THAT OF THE SINGLE STATION
One VHF Station (Std. Dev. = 8 db)
4 STATIONS
3 STATIONS
2 STATIONS
One UHF station (Std. Dev. = 12 db)
RELATIVE FIELD INTENSITY - DB
17
10
0
-10
-20
-30
1
10
30
50
70
90
99
99.9
99.99
P (F_1 or F_2 or .... F_4 > F) in percent

FIG. 4


PROBABILITY DISTRIBUTIONS OF SIGNAL LEVELS BEING EQUALLED OR EXCEEDED BY AT LEAST ONE OF EITHER 2, 3 or 4 UHF STATIONS AS COMPARED WITH SINGLE STATION DISTRIBUTIONS.
TOTAL POWER OF THE SEVERAL UHF STATIONS IS EQUAL TO THAT OF THE SINGLE STATION.
RELATIVE FIELD INTENSITY - DB
y
15
10
0
-10
-20
4 STATIONS
3 STATIONS
2 STATIONS
One UHF Station (Std. Dev. = 5 db)
One UHF Station (Std. Dev. = 5 db)
1
10
30
50
70
90
99
99.9
99.99
P (Y1 or Y2 or ...Yn ≥ y) in percent

Mr. Cox. Is it contemplated the testing in New York will encompass the multicasting technique?

Mr. LEE. Yes, we plan on at least two and perhaps three frequencies in New York City. Now, I think we would, before we decide how far we would go, we might perhaps start with one and see where we would want to put another, and so on, and move rather slowly; but this will be designed to fill in whatever holes develop.

Mr. Cox. Do your engineers have an estimate of the time that will be required for this test, if the appropriation is obtained?

Mr. LEE. I think we have been talking in terms of 2 years.

Mr. Cox. Appendix V to your statement, as I understand it, puts in tabular form the slides which were shown to the committee on Tuesday, showing the comparative coverage in this test area in the northeastern United States both as to one service and as to five services using the varying systems that have been under discussion. It is my understanding that you believe that this demonstrates that UHF can serve all the Commission's goals of overall service, of multiple service, and of local service, better than 12 VHF channels can?

Mr. LEE. Yes, that is my firm opinion. Those are still the objectives of our so-called sixth report and order.

Mr. Cox. And the one serious qualification on that, as to which, I take it, you feel the Commission—if it becomes convinced, as a result of this test, of the feasibility of an all-UHF system—must perhaps take a calculated risk—is the question of whether stations will be built where stations can be built under such a system?

Mr. LEE. I think that this will have to develop under the economics of the particular area, yes.

Mr. Cox. Now, on pages 16 and 17 of your statement, you refer to some suggestions for drastic reduction of mileage separations. Does this refer to ideas such as those of Kenneth Norton, of the National Bureau of Standards, and others who are talking about separations on the order of 100 miles?

Mr. LEE. Yes, we had that in mind, and also an illustration of how this particular plan would perhaps increase interference about as much as you would increase service.

Mr. Cox. But I understand that even though that might well be the result, that it is your feeling that if television is to be confined to the 12 VHF channels, because the Commission does not feel it can shift to all-UHF, because it can't get additional VHF frequencies from the Government, and because it can't work out a system for the coexistence of V and U in a unified system, that if you were thus restricted, you, for one, would feel compelled to give consideration to these proposals because only in this way could you ever get any room for expansion in the number of services?

Mr. LEE. Yes. I think, Mr. Cox, that when and if the UHF is dead—and certainly we can't justify keeping it if we don't use it—at that point I think my thinking now would be that I would be forced to consider rather drastic reductions. I think that the pressures of the expanding population would just insist that there be more stations, and this would be perhaps a better way of living within the 12 channels than to freeze it with a relatively few owners now.

Mr. Cox. Certainly if something of this sort were not done, there are indications in the record already from members of the Commission

that if the system were frozen at its present levels, there would be grave danger that the Commission would have to undertake much more rigid regulation of the industry than would be necessary if, with a little room for expansion, the normal forces of competition could be trusted to take care of it?

Mr. LEE. I think this would be inherent in that; yes.

Mr. COX. In appendix VI to your statement you list towns and cities of from 5,000 to 140,000 population, which, as I understand it, would be beyond the primary service range of the stations in the proposed all-VHF system. Now, I am not entirely clear whether this is a 25-channel system or a 50-channel system that would not service these?

Mr. LEE. This particular table was based on the 50-channel system.

Mr. COX. Now, even though these communities would be beyond the primary service range, I would assume that many, if not all, of them would be getting some kind of at least fringe service from those VHF stations?

Mr. LEE. I would assume so. I think if you put your receiving tower up high enough, you can always get fringe service no matter where you are.

Mr. COX. That completes my questions directed to Commissioner Lee's statements. I do have questions for the majority of the Commission on their previous statements.

Senator PASTORE. All right.

Mr. COX. We may have some problems, since Chairman Doerfer is not here, as to who is to answer, but I think Commissioner Hyde can control the matter and refer the matters to other Commissioners if he feels it is appropriate.

My first question—I have some questions with respect to this continuing negotiation with the military, and perhaps Commissioner Ford would be the appropriate person to answer them.

There is a statement in your report to the committee of last year with respect to the necessity of determining, even if additional frequencies were available from the military, the possibility of reassigning effectively services for which you are now responsible and which operate in the areas which would be preempted for this 25- or 50-channel system. My question is whether you have determined, or have yet considered, whether it would be possible for you to move services now licensed in the band between 216 and 450 megacycles to the higher frequencies which would be the only ones available if such a shift were made?

Mr. FORD. What is the specific question?

Mr. COX. Have you made a determination as to the engineering possibility, if you could put together a 25- or 50-channel VHF system——

Mr. FORD. Where the displaced services would go?

Mr. COX. Yes, and whether they could operate effectively at the new frequencies to which they would have to be removed?

Mr. FORD. There has been some study of that in this technical group, but there has been no determination of it. I think in the area occupied by the Government, I don't think we have examined where they can be replaced; but obviously it would have to be in some area now occupied by nongovernmental services.

Mr. Cox. Quite apart from the availability of frequencies from the Government, is the Commission able to represent to the Government that if this change were made, the services for which the Commission is responsible could be properly accommodated?

Mr. FORD. Well, there is very little problem as to where non-Government services would go, because there are very few nongovernmental services in this area. The problem is pretty much confined to where, and in what order of frequency, the Government services now in this area could be moved.

Now, there has been propagation—as to the statement that I submitted the other day—propagation information collected from the Bureau of Standards. That has been available to the technical group in considering that problem, and it has been studied, yes.

Mr. Cox. You don't feel, then, there is any danger of an obstacle to this proposal, if it is otherwise feasible, in relocating the nongovernmental services?

Mr. FORD. I can't go that far.

Senator PASTORE. Now, if I may interrupt for just a moment. We have another witness here, Mr. Beckman. Is he here?

Mr. BECKMAN. Yes.

Senator PASTORE. Mr. Beckman, how long do you intend to take?

Mr. BECKMAN. About 25 minutes, sir.

Senator PASTORE. Mr. Beckman, Mr. Cox expects to be another three-quarters of an hour with the members of the Commission. I don't think I will have any other questions to ask, though I may interrupt here and there, and I have another meeting at 1 o'clock. Do you have any objection to going on around quarter past 12, or so, and continuing until we recess for lunch at around 1 o'clock?

Mr. BECKMAN. None whatsoever.

Senator PASTORE. Are there any other witnesses here for this morning's hearings?

(No response.)

Senator PASTORE. All right, then, we can proceed.

Mr. Cox. Commissioner Ford, have you been able to get from the Government any impression as to the cost to the governmental services of a shift of military and other equipment to another portion of the spectrum if they were to surrender the frequencies that you are negotiating for?

Mr. FORD. Yes, sir; we have estimates of those costs.

Mr. Cox. Just in rough terms, on what order would they be?

Mr. FORD. In some areas fairly accurate; in others, rough but knowledgeable.

Mr. Cox. The Chairman, the other day, used a figure of $1 billion cost to the Government as contrasted to $2.5 billion for converting the public's sets to UHF. Is that billion a figure of speech, or a figure based on what you have learned?

Mr. FORD. Well, I think he was using it as a comparison; he wasn't using it as a specific portion—as to particular services in a particular portion of this Government area. I think in some areas—I hesitate to answer that question, not because I wouldn't like to give you the answer, but I think that when you get specific as to costs in the Government area——

Mr. Cox. We are in trouble with classification?

Mr. FORD. Yes; I think that a billion dollars, I think you can say is——

Mr. COX. Is too low?

Mr. FORD. It depends. It could be and couldn't be. There are figures that involve that much and more.

Mr. COX. Well, have you gotten from the representatives of OCDM an estimate of the time that would be required for the phaseout period before they could release the frequencies, if they decided they could eventually surrender them?

Mr. FORD. The terms of reference we are talking about are, say, 10 to 15 years. Now, in particular areas, phasing out could be much faster than that, and that has been the subject of study.

Mr. COX. Would this include—or would there have to be added to this—time for the international negotiations which are referred to in the majority statement because of the fact that some of these frequencies are now devoted to uses which have international application?

Mr. FORD. There again, in the statement that was submitted there are three principal difficulties in any move here, and one of them is this international question—the question of some of our allies being equipped with interchangeable equipment, and for us to unilaterally make a shift in that would destroy, perhaps, some arrangements.

Mr. COX. I take it these negotiations would have to be undertaken first, before a phaseout started, and that you would then add on the 10 to 15 years that would be required for actual release of the frequencies?

Mr. FORD. As an ultimate, yes, I think that is so.

Mr. COX. Now, has the Commission formed any final estimate, or any really very precise estimate, as to the cost to the public of making the shift to one of these all-VHF systems?

Mr. FORD. I think when you get into the question of cost to the public, any shift which involves the use of channels other than the 12 V channels runs into substantially the same amount. For instance, if you decide to have an all-channel receiver and phaseout with the statute that has been suggested here, then as each person buys a new set over a period of 5 to 8 years, they would acquire an all-channel receiver.

If that is an 82-channel system, a 50-channel system, or a 25-channel system, there may be a very small dollar differential; but substantially the economics of it is the same no matter what. And even if you stay with 12 channels, in the course of the next 8 to 10 years most people will replace their sets, so when you start talking about going to UHF ultimately and phasing into it, or phasing into a 25- or 50-channel system, the costs are going to be about the same no matter what happens, so far as the public is concerned. So I do have a little difference with the $2½ billion figure.

If you did it immediately, then you would have those astronomical figures in cost to the public. If you phase it, those costs are going to be about the same.

Senator PASTORE. That being the case—and it being admitted yesterday, impliedly, I would say, that the prospects are not too favorable that the military will relinquish the spectrum it now has for governmental purposes—and insofar as the public is concerned the cost is going to be more or less the same whether you go to one system

or the other, that is, whether you go to VHF, or use the whole spectrum with the 82 stations, why are we preferring to keep on negotiating with the military, and not pursuing more strongly the other alternative?

I will tell you very frankly that as I view this, is it like negotiating with the Russians on cessation of tests; we cannot afford to stop negotiating, even though we know when we do we are not getting anywhere. I think you are up against the same sort of situation. I am not being critical of you, but I don't see this happening by April 1. I say that frankly and honestly. I hope I am wrong.

If we are going to meet the same obstacle, so far as the viewers are concerned, why are we concentrating so much on the impossibilities rather than exploring the possibility?

Mr. FORD. I think the answer is that the propagation characteristics, and the development of receivers, is well known in VHF, and it is a fairly well developed system; and if additional channels can be obtained adjacent to channel 13, then the problems of set construction, the propagation characteristics of the frequencies, the distance and immediate service to the people offers more promise.

Senator PASTORE. Therefore, for the record, is it safe for me to say that a great deal remains to be done in the field of UHF as a nationwide competitive system, technologically speaking, before we are sure that it is as good as VHF?

Mr. FORD. I think that is very true.

Mr. COX. Is there enough difference in the propagation characteristics of the channels on either end of your 50-channel system to pose some of the problems that now exist as between VHF and UHF, even if in lesser degree? In other words, would there be higher cost of transmission at certain of these channels than at others? Would there be more limited range to their signals?

Mr. CRAVEN. I assume that your are using as your basis of comparison the present range as between channel 2 and channel 83?

Mr. COX. Yes.

Mr. CRAVEN. Well, you are talking about cost of receivers?

Mr. COX. Well, I am talking about cost of receivers, transmitters, and range of operation.

Mr. CRAVEN. As you go up in frequency, for the same power you progressively get less coverage.

Now, as to the cost of the receivers, the wider the range, such as from channel 2 to 83, in my opinion it will cost more. Now, as to the cost of the transmitter, that depends entirely upon the power and the antenna height that you want to go to. I think that, generally speaking, the higher the frequency, there is a slight increase in cost, because in order to get similar ranges, you have to have more power.

Mr. COX. Would a station operating on channel 51—if you got these additional channels—as compared to a station presently operating on channel 2, suffer a competitive disadvantage in the same market because of inability to get its signal out?

Mr. CRAVEN. He has a disadvantage if he is on channel 51.

Mr. COX. And would it have somewhat additional cost for power in the operation of transmitting?

Mr. CRAVEN. Yes.

Mr. Cox. What is the comparison of cost of receivers as between a receiver that is required to bridge between channel 14 and channel 83, and the cost of a receiver, that would bridge between existing channel 2 and proposed channel 51?

Mr. CRAVEN. I don't know the answer right now. I will try to furnish that for you.

Mr. Cox. All right.

I asked Commissioner Lee awhile ago about this suggestion of Kenneth Norton. The committee has noted a letter from him to the Chairman of the Commission, and has received copies of some additional correspondence. As I understood it, his proposal was one that the Commission should adopt, as a basic tool of allocation, the proposition of maximizing the coverage of a channel rather than the proposition of maximizing the coverage of individual stations, and that he contended this could best be done by operation of a 12–V system at high powers, with high towers, and using from 100 to 110-mile separations? Is that roughly it?

Mr. CRAVEN. As I recall, that is roughly his suggestion. I do want, at this point, to say that I have great admiration for Mr. Norton as a wonderful physicist. I don't believe he understands very well the practicalities of broadcasting, particularly from an economic standpoint.

Mr. Cox. Was this short spacing study which Mr. Cowperthwait presented in slide form the other day an approximation, at least, of Mr. Norton's proposal?

Mr. CRAVEN. That is right; it was.

Mr. Cox. And the Commission concluded this was not an improvement over the existing system which merited consideration?

Mr. CRAVEN. I think that statement is correct. I want to answer, for my own point of view, that I cannot see my way clear to adopting any phase of Mr. Norton's proposition. We are sending to you the detailed studies of Mr. Norton's proposition.

Mr. Cox. Yes; they were delivered to me this morning, and such parts as appear relevant will be put in the record at a later point.

(This material is set forth at the opening of the hearing on February 5, 1960.)

Mr. Cox. With reference to this short-range proposal for some interim adjustments while the Commission is trying to arrive at a long-range solution to the problem, the Commission has, of course, recently initiated this rulemaking looking toward the possibility of waiver of its minimum separations in exceptional cases. This was issued for comment about the 4th of January of this year, wasn't it?

Mr. CRAVEN. I was not here at the time. I think that is correct, but I am not sure.

Mr. Cox. Now, in this notice of proposed rulemaking, the Commission refers to the statement submitted to the committee on April 17 of last year in which you indicated that, pending the pursuit of long-range solutions, some interim action was clearly needed and that immediate steps must be taken to remedy the critical shortages of facilities in a number of important population centers, and you noted this could be done only by adding VHF assignments at less than minimum spacing. Is that a reasonable paraphrase of the prolog to your notice?

Mr. CRAVEN. I prefer that someone else answer that, because I was not here and did not take part in the issuance of the order, and therefore am not too familiar with what was on the Commission's mind at the time.

I will say from my own standpoint that I believe we have to go to certain short separations in some of the important markets in order to preserve a reasonable amount of competition between the three networks. I think it is important that we have as much competition as possible, and that unless we do provide for some short separations, in order to equalize some of the competition in the important markets that it will be reprehensible.

Mr. COX. I think you indicated that to the committee in May or June of 1958.

Mr. CRAVEN. I would prefer that you question some of the other members of the Commission on this, because I am not certain that I am reflecting their views.

Mr. COX. I believe, Commissioner Ford, you were a member of the majority that approved the notice, in No. 13340, on interim separation reductions?

Mr. FORD. That is right, but I thought your question went to what we told you last April.

Mr. COX. A recital of what you told us last April. In other words, isn't it true that you preface this notice by a recital of what was reported in your written statement to the committee of last April?

Mr. FORD. Yes.

Mr. COX. My question was the explanation for the waiting 8½ months after this recognition, in April, of the pressing scarcities, and so on, for the issuance of the notice. What is involved in this time factor?

Mr. FORD. I would like to point out that in our statement to you in April, on page 41, we said that this interim policy must be carefully circumscribed to be consistent with our long-range allocation policy. It must be focused on alleviating only the most critical shortages.

Now, in this period, I think you saw on our last appearance here the number of slides in which all sorts of mileage separations and engineering studies have been made, trying to come up with some sound basis that would not be a quick solution now, and maybe bar a long-range program. I think Commissioner Bartley's statement indicates some concern over the possibility that if too much action and too many cities are taken care of at this point, it may very well have an adverse effect on any long-range solution.

I think you have to bear in mind that the interim policy has to keep its eye on the alternatives that the Commission is faced with. A short-range separation at the moment, in the event additional V's are obtained would be replaced, and the normal separations restored, so that the fringe area service to rural areas would not be deteriorated. On the other hand, if the Commission does eventually go to a UHF system, then, of course, it would become fairly unimportant.

All of these studies and these problems are things that can't be done too quickly.

Mr. COX. You did set forth some suggested engineering standards as to measurement of coverage in the report, but the portion which asks for comments on the desirability, or possibility, of making

waivers is not one which prescribes, or even suggests, anything initially other than the conditions to surround such applications. My question is, Why shouldn't this have been issued promptly and the comments of the industry obtained while the Commission was making these studies. For instance, how long is it going to take now for this proceeding started in January to be concluded?

Mr. FORD. Oh, I think initially we gave 30 days. There are new propagation curves involved here, and propagation curves are not developed very quickly.

It seems to me that we have had meeting after meeting on this, and spent all sorts of time trying to develop this, and, of course, at the same time carry on a multitude of other work; but so far as the staff is concerned, this has been the top priority item with them, and they have been working on it as fast as they could work on it.

Mr. COX. Am I correct in assuming that you will not actually, in this particular proceeding, make any channel adjustments; that you are now seeking, in effect, comments on whether you should even consider making such waivers in appropriate cases?

Mr. FORD. I think that is right.

Mr. COX. In other words, you are going to have to conclude this proceeding, and then there will be other proceedings, involving individual markets, in which particular interests will petition for a specified channel change—if you ultimately decided that you would be willing, on proper conditions, to waive the separations?

Mr. FORD. That is right; and this rulemaking proceeding has some interference standards in it that hadn't existed before, and those were essential before you could go into this kind of a proceeding.

Mr. COX. Now, will it be possible for interested parties—if they are willing to take the chance on a favorable decision, or favorable Commission action on this proposal—to presently get underway, pending the conclusion of this rulemaking, an application for an adjustment in their particular market?

Mr. FORD. Well, yes; if they want to take the chance—and assuming that the rules in the form proposed would be adopted in that form.

Mr. COX. The Commission is actually doing this on its own motion in a number of instances, isn't it?

Mr. FORD. Yes, and, as a matter of fact, we have proposed, I think in two or perhaps three instances, assignments at short separations.

Mr. COX. So that there is to some degree a possibility of overlap here?

Mr. FORD. That is right, and, of course, there is some risk involved in that, but we have done it; and I think you probably appreciate the legal risk we took at the time we were trying to do that simultaneously.

Senator PASTORE. And if everything goes according to schedule, when would you expect a station to operate at a profit? I am just trying to point out the possibility.

Mr. FORD. That could vary considerably depending upon how the legalities of the situation develop. For instance, if we are involved in section 316 hearings——

Senator PASTORE. For the purposes of the record, take it step by step. This procedure that you have now initiated touches upon whether or not you will engage in the rulemaking, is that right? In other words, this is to determine the overall policy. That is the first step—whether or not it is good to engage in this.

After you determine whether or not it is good to engage in this, then you have got the situation that the applicant begins to file for one of these applications, right?

Mr. HYDE. Well, I think you oversimplify it a bit.

Senator PASTORE. Well, that is the trouble with me, that is the trouble with me. [Laughter.] I always try to get to the core of it, and that is why I feel so frustrated in dealing with these matters with the Commission, because I never get an answer, I never get the problem resolved.

Now, you explain, Mr. Hyde, the procedures involved before a part of the country that has this disturbance will have the availability of this new station; you just explain it to me step by step, just about how long this is going to take, just so that these people who are patiently waiting for this service will know when they can reasonably expect the service.

Mr. HYDE. Well, Senator, the basic rulemaking raises the policy questions as to short separations and conditions—on what the criteria would be in making such separations.

Then there is the separate rulemaking proceeding relating to specific assignments, such as the one at Providence. We have been asked by responsible members of industry and interested parties for an extension of time in which to submit data on the basic policy question.

The Commission will have to determine what a reasonable length of time will be there. They had initially, as I read from their record, expected comment and countercomment to be in by March 7, but more time has been requested.

Mr. COX. It has been granted to May 4, has it not?

Mr. HYDE. It think that is right, 60 days.

The other rulemaking, which I personally thought was premature, has nevertheless been issued by the majority of the Commission, and it does present the possibility of simultaneous consideration of an individual case while the basic problem is being weighed.

Well, let's assume that criteria are established for undertaking separations shorter than what we have had now, and perhaps some area for application is determined upon some well-reasoned statement of policy, and you also conclude the rulemaking with respect to Providence. You have the possibility that another channel, or that a channel which is already in a contest, would be made available at another location.

Now, you have many possibilities as to further processes which I think you are well aware of. What are the rights of these several applicants who have been contesting for the channel for a transmitter location in Martha's Vineyard? Are they going to continue to prosecute those claims; or are they going to join in on an effort to move the station to Providence?

And let us assume that they determine that it would be wisdom on their part to do that. Can we be certain that other persons wishing to file applications could be precluded from doing so? Would it be fair, and could they be cut off from such opportunity under the provisions of the law—and I am referring both to the Administrative Procedures Act and the procedural provisions of the Communications Act.

There is a good deal of question on this matter.

Mr. Cox. Is there any chance, if it is once decided that you are going to allocate an additional channel to a particular community, that the Commission could develop procedures to expedite bringing the service to the public by authorizing some kind of a joint operation by the applicants, or an operation in trust for the applicants, subject to the ultimate determination?

Mr. Hyde. We have authorized interim operation in instances where the parties who were contestants for the right to use the channel have agreed to it. This was done in Shreveport and New Orleans. It is possible, but it is usually necessary to have an agreement of the parties, because any time that you do not get a stipulation, then you run into the risk that someone will charge that his hearing rights have been prejudiced by the operation of the others.

Mr. Cox. There would be nothing to preclude the Commission from issuing a policy statement that it favored such arrangements where they could be arrived at by the interested parties?

Mr. Hyde. No; there would be nothing to prevent the Commission from indicating that it would entertain a petition or request for such operation under conditions which would not be prejudicial to the hearing rights of any interested applicant.

I believe, sir, that the grants that were made in Shreveport and New Orleans are indicative of the Commission policy in this field.

Senator Pastore. And short of such agreement being reached, it could take a long, long time?

Mr. Hyde. It could, sir, and while we try to manage our hearings as expeditiously as possible——

Senator Pastore. I am not being critical. I know you have to abide by the law.

Mr. Hyde. I am sure you know that due process in the administrative law, with all of its phases, is not something that can be accomplished quickly.

(A letter from Commissioner Hyde to Senator Pastore dated February 16, 1960, with its enclosure, follows:)

Federal Communications Commission,
Washington, D.C., February 16, 1960.

Hon. John O. Pastore,
Chairman of Subcommittee on Communications,
Committee on Interstate and Foreign Commerce,
U.S. Senate, Washington, D.C.

Dear Senator Pastore: This is in reference to my testimony of February 4, 1960, before your subcommittee, in which I commented that it is difficult to expedite initiation of new VHF service to an area even after rulemaking has been completed, because, in the absence of an agreement among the parties involved, the Commission runs the risk that someone will claim his hearing rights have been prejudiced by operation on the VHF channel by another.

In this connection, I am enclosing for your information a copy of a decision by the U.S. Court of Appeals for the District of Columbia Circuit in *Community Broadcasting Co., Inc.* v. *Federal Communications Commission* (cases Nos. 15313 and 15314), decided February 8, 1960, in which the court vacated a special temporary authority to operate on channel 9 at Baton Rouge, La., issued to WAFB-TV.

Sincerely yours,

ROSEL H. HYDE, *Acting Chairman.*

UNITED STATES COURT OF APPEALS FOR THE DISTRICT OF COLUMBIA CIRCUIT

No. 15313

Community Broadcasting Co., Inc., appellant, v. *Federal Communications Commission, appellee*

Modern Broadcasting Company of Baton Rouge, Inc., intervenor

No. 15314

Community Broadcasting Co., Inc., petitioner, v. *United States of America, Federal Communications Commission, respondents*

Modern Broadcasting Company of Baton Rouge, Inc., intervenor

APPEAL FROM AND PETITION FOR REVIEW OF ORDER OF THE FEDERAL COMMUNICATIONS COMMISSION

Decided February 8, 1960

Mr. Frank U. Fletcher, with whom *Messrs. Robert L. Heald and Russell Rowell* were on the brief, for appellant in No. 15313 and petitioner in No. 15314.

Mr. Max D. Paglin, Assistant General Counsel, Federal Communications Commission, with whom MESSRS. *John L. FitzGerald,* General Counsel, Federal Communications Commission, and *John H. Conlin,* Counsel, Federal Communications Commission, were on the brief, for appellee in No. 15313 and respondent, Federal Communications Commission in No. 15314. *Mr. Richard A. Solomon,* Attorney, Department of Justice, was on the brief for respondent United States of America in No. 15314. *Mr. Richard M. Zwolinski,* Counsel, Federal Communications Commission, also entered an appearance for appellee in No. 15313 and respondent Federal Communications Commission in No. 15314.

Mr. Harold D. Cohen with whom *Messrs. Vernon C. Kohlhaas* and *William S. Green* were on the brief, for intervenor. *Mr. Thomas N. Dowd* also entered an appearance for intervenor.

Messrs. James A. McKenna, Jr., and *Vernon L. Wilkinson* filed a brief on behalf of American Broadcasting-Paramount Theatres, Inc., as *amicus curiae,* in both cases urging dismissal.

Before WILBUR K. MILLER, DANAHER and BURGER, *Circuit Judges.*

BURGER, *Circuit Judge:* Appellant challenges the action of the Federal Communications Commission which granted to Modern Broadcasting Company (intervenor) a Special Temporary Authority (hereafter S.T.A.) to construct and operate a TV station on Channel 9, V.H.F., at Baton Rouge, Louisiana. Modern has been operating station WAFB-TV in Baton Rouge, Louisiana, on UHF, Channel 28, since 1953, and has been sustaining operating losses since 1956. Channel 9, VHF, had been shifted, on June 3, 1959, by a rulemaking proceeding not challenged here, from Hattiesburg, Mississippi, to Baton Rouge.[1]

On June 15, 1959, Modern applied for a construction permit for Channel 9 at Baton Rouge and, on June 18, filed a request for Special Temporary Authorization to permit immediate use of the channel without awaiting a comparative hearing. Modern asserted that it could not in any event continue its operations on the UHF Channel 28 beyond 1959 in view of the financial losses being sustained. Modern's application asserted also that it would be "willing to conduct such temporary operation under the express condition that it will expire automatically upon the commencement of any regular operation on Channel 9" resulting from the Commission's final action on the grant. Modern also agreed

[1] Matter of Television Broadcast Stations (Baton Rouge, Louisiana—Hattiesburg, Mississippi), 18 Pike & Fischer RR. 1666 (June 3, 1959).

that "no effect whatsoever shall be given to any expenditure of funds * * * and that no preference shall be accorded to [Modern] by virtue of the [temporary] grant * * *."

Community Broadcasting Co., Inc., petitioner here, filed objection to the request for temporary authority, saying it would file its application for Channel 9 along with a request for a S.T.A. pending final action on the application. On July 21, 1959, Community filed an application for a construction permit but filed no request for temporary authority to operate pending final action.

The two applications being mutually exclusive, a comparative hearing for a license for regular operations became imperative. Modern renewed its request for temporary authority and Community again objected repeating its assertion that it would file a request for the S.T.A. and that any action by the Commission at that time on the question of interim operating authority would be premature because it could not be known how many applicants might ultimately seek comparative consideration for the Channel.

On July 22, 1959, one day after Community's construction permit application was filed, the Commission granted Modern's application for the S.T.A. pending the conclusion of a comparative hearing on the competing applications for permanent operations,[2] theirs being the only request for temporary authority then before the Commission. It predicated its action on the fact that the Baton Rouge reallocation problem had been under formal consideration since October 1957; that due to the probability of a long comparative hearing regular authorization could not be issued with respect to Channel 9 for several years; and that the public need for an additional V.H.F. channel at Baton Rouge, which need had led to the reassignment of channels, could be met promptly only by the grant of special temporary authorization.

Community filed a petition for reconsideration and a motion for a stay of the S.T.A. grant to Modern; the Commission denied Community's stay request on July 29, 1959.[3] Community then withdrew its petition for reconsideration and sought review here of the Commission's action granting the S.T.A. to Modern.

Appellant urges numerous grounds for reversal. The Commission urges, among other things, that many of these points were never raised to the Commission below, and hence may not be raised now. *N.L.R.B.* v. *Cheney California Lumber Co.*, 327 U.S. 385 (1946). The Commission nevertheless seems to suggest that this court has before it a "public notice" granting Modern its temporary authority, and its explanatory letter to appellant concerning the grant. We therefore limit our review to the original Modern application, and appellant's objection.[4]

Modern's application rests on the fact that if a comparative hearing be necessary, VHF service on Channel 9 for Baton Rouge would be delayed for several years; that its UHF station was sustaining losses and would be forced to cease operations if the grant were not forthcoming at once; that in this event there would be no competitive television service in Baton Rouge; that the public interest would be better served by beginning VHF competitive service in accord with the basic purpose of the Commission's order re-allocating the channel; and that certain possible overlap problems were not sufficiently grave as to preclude the temporary grant.

Appellant, in its opposition, contended that it intended to request the S.T.A. for the channel; that it was as qualified as Modern to receive such authority; that the reasons advanced by Modern were insufficient to sustain the grant;

---

[2] The Special Temporary Authorization contains the usual recital: "No effect whatsoever will be given to any expenditure of funds by Modern Broadcasting Company of Baton Rouge, Inc., pursuant to the temporary authorization herein in any comparative hearing involving regular operation on Channel 9 in Baton Rouge nor will any preference redound to Modern Broadcasting Company by virtue of temporary operation on Channel 9." Commissioner Cross voted to deny Modern's request for Special Temporary Authority and dissented from the denial of a stay.

[3] The Commission asserts it cannot complete a comparative hearing on the two competing applications for Channel 9 short of about 2½ years.

[4] The Commission's Brief (p. 15) seems to take the position that what is now before this court for review is the "public notice" together with "a letter from the Commission to appellant informing it of the action taken. This letter * * * is, we believe, reviewable to the extent that it represents the Commission's determinations with regard to matters raised in the objections." Appellant's "objections," as we point out, included an objection that the reasons advanced by Modern were insufficient to sustain grant of the S.T.A. Moreover, Commissioner Cross' dissent sharply brought to the attention of the Commission its failure to consider the important issues of overlap of commonly controlled services and concentration of mass media.

and that the overlap problem was significant. The Commission nevertheless granted Modern's request.

We think that the issues raised in the Commission, together with its action in granting the S.T.A. for an indeterminate period while multiple applications for construction permits for regular operations are pending gives each applicant standing in this court and affords a basis for review as to whether the Commission's action has a sufficient basis to support it.

The problem of temporary authorizations gained significance after the ruling *in Ashbacker Radio Corp.* v. *Federal Communications Comm'n*, 326 U.S. 327 (1945). The Supreme Court there held that where two mutually exclusive applications are made for the same frequency, the Commission cannot grant one application for regular operations pending the holding of a comparative hearing since the subsequent hearing would then be "an empty thing." *Id.* at 330.

A practical problem immediately presented itself. Comparative hearings are lengthy and detailed affairs, frequently taking years before final conclusion. Occasionally the need for continuing already operating services, or establishing new ones, was so great as to render it against the public interest to withhold authorization pending final outcome of the necessary hearings. See *American Broadcasting Co.* v. *Federal Communications Comm'n*, 89 U.S. App. D.C. 298, 191 F. 2d 492 (1951); *Peoples Broadcasting Co.* v. *United States*, 93 U.S. App. D.C. 78, 209 F. 2d 286 (1953). The Supreme Court implicitly recognized the dilemma for it carefully pointed out in *Ashbacker* that the Commission there did not *conditionally* grant the application, an inference at least that such a conditional grant pending hearing was proper in some circumstances. 326 U.S. at 331.

Thereafter, the Commission evolved a policy of granting such temporary authority in certain circumstances. We have upheld such temporary grants, given without a comparative hearing, against contentions that such procedure violates the *Ashbacker* rule. *Peoples Broadcasting Co.* v. *United States*, *supra*. Such grants are a "practical solution of a problem which involved the public interest in the continuity and quality of television service." *Id.* at 80, 209 F. 2d at 288.

Nevertheless, the existence of a power to grant temporary operating authority does not necessarily mean that it is to be granted in all circumstances simply because there is to be a long delay in completing the comparative hearings. The grant of temporary authority to one of several competing applicants before there has been any hearing is pregnant with danger to truly comparative consideration. The temporary grantee must take all the steps and make substantially all of the investment he would make if granted a construction permit for regular operations. Intervenor here estimates his probable investment under the temporary authority as in excess of one quarter million dollars. Appellant and the Commission suggest the investment may be larger. In the 2½ years, or more, before the comparative hearing can be completed, intervenor will accumulate the great advantage of demonstrated past performance as against the promised future performance of the competing applicant.

Undoubtedly, the public interest may in some circumstances overbalance the possible disadvantages which flow from temporary operations, as for example, where a community has no existing service, or stands to lose its only service. See *Peoples Broadcasting Co.* v. *United States*, *supra*. Yet the Commission has itself described the temporary authorization procedure "extraordinary" and one to be employed "solely in light of the particular problems involved in providing a *continuing* television service to the people. . . ." *Matter of Springfield, Illinois-St. Louis, Mo. Tel. Broadcast Stations*, 15 Pike & Fischer RR. 1525, 1537 (1957). (Emphasis added.) See also *Matter of Albany-Schenectady-Troy & Vail Television Broadcast Stations*, 15 Pike & Fischer RR. 1514(a) (1957) and *Matter of Carbondale-Harrisburg, Illinois Tel. Br. Stations*, 16 Pike & Fischer RR. 1617 (1958). These considerations necessarily mean that the Commission must set forth with some particularity the reasons for its issuance of such a grant, in such form that a reviewing court can ascertain that all essential factors have received adequate consideration.

The intervenor agreed and the Commission asserts that no weight is to be given to the investment involved in the temporary operation or the advantages which inhere in satisfactory interim operation for 2 to 3 years and that this adequately safeguards appellant's rights. It is suggested that to question this involves a challenge to the good faith of the Commission. But this is not a matter only of good faith. Ordinary human experience tells us that these factors

have a force which cannot always be set aside by the triers no matter how sincere their effort or intent. The Commission realistically concedes that if the grant is ultimately made to appellant rather than to intervenor, 2½ or 3 years hence, the latter's market to dispose of its large "temporary" investment in a going television station is "one man," i.e., the successful applicant. In that eventuality the losing party faces the problem of salvaging whatever he can on a distress market. To argue, as appellant does, that this may weigh in the balance of an otherwise close question is not a challenge to the good faith or integrity of the triers; it is a recognition that they are mortal men.[5]

Where a substantial number of people would be deprived of all service for a long period there could well be an overriding public interest which could be served only by the "extraordinary procedure" of a temporary grant pending a comparative hearing. But the spirit of the *Ashbacker* doctrine requires that to justify the granting of "temporary" authority for so long as 2½ to 3 years, the public interest must be clear and it must be made the subject of explicit findings in the particular case in unmistakable terms; and such deterrent factors as concentration of media and overlap must be explicitly dealt with in findings which afford an adequate basis for appellate review. The theoretical injury to the public which may in some circumstances flow from deferral of the added service is more than offset by a process which makes certain that all essential factors have been fully considered before this important power is exercised.

The basic teaching of the *Ashbacker* case is that comparative consideration by the Commission and competition between the applicants is the process most likely to serve the public. While the *Ashbacker* case dealt with grants for regular operations, rather than temporary, the reasoning of the Court has much force as applied to "temporary" authorizations which last for 2½ to 3 years. A "temporary" grant for such a period so closely approximates a statutory three-year license, in which renewal is subject to the same considerations which affect the original grant, that the device of a temporary authority was rightly characterized by the Commission as an "*extraordinary procedure.*" That the grant of temporary authorization to one applicant has an inevitable tendency to discourage competitors for construction permits is added reason for us to emphasize that it is a process calling for close scrutiny.

We now turn to consideration of the source of the Commission's power to issue temporary authorizations "pending final action on any applications for regular operations on that channel; . . ." which is the only limit on the authority granted to intervenor. The Commission urges that power to issue this temporary authorization is found in Sec. 1.331 of its Rules and Regulations which provide in part:

> (b) Temporary authority may be granted to a licensee or permittee of a broadcast station to operate such station *for a period not to exceed 90 days* upon request thereof. Any such request should be filed with the Commission at least 10 days prior to the date of the proposed operation, and should be accompanied by a statement giving full particulars as to the purpose for which the request is made. Any temporary authority issued under this section may be cancelled by the Commission without further notice or hearing. [Emphasis added.] 47 CFR 38 (1958).

Because of the express terms of the grant for an indefinite period ("pending final action"), this "90 day" section is not controlling.

This argument of the Commission is accompanied by the suggestion that Sec. 1.63 of its Rules supports its action here. That Section provides:

> (a) Whenever it appears that a station license . . . should be modified, the Commission will notify the licensee . . . in writing of the proposed action and the grounds and reasons therefor and direct him to show cause why an order modifying the license . . . *in the manner proposed by the Commission* should not be issued. [Emphasis added.] 47 CFR 14 (1958).

This regulation goes on to describe procedures for the licensee to have a hearing on the changes proposed by the Commission. Plainly this is not applicable to our problem. Inferentially the Commission suggests (a) intervenor now operates Station WAFB–TV, UHF at Baton Rouge, (b) the temporary authorization is merely "a modification" from Channel 28 UHF to Channel 9, VHF. This oversimplifies the problem. The heart of this case is which of the competing applicants is best qualified for regular operation of the newly assigned Channel 9

[5] The Commission informs us that in only one situation in the past where it has granted a special temporary authorization has it failed to grant the construction permit to the same grantee after a comparative hearing and in that case the temporary grantee was found to have committed a fraud on the Commission.

VHF and we categorically reject the idea that this is asimple matter of "modification" of existing facilities. The Commission did not propose a change in the sense contemplated by Section 1.63 for which change a licensee may demand a hearing; the Commission acted in response to applications filed and in relation to a new VHF channel not previously available at Baton Rouge.

There is, however, another Regulation which seems to bear on the present situation. Sec. 1.362(b) provides:

> (b) Where a grant of an application would preclude the grant of any application or applications mutually exclusive with it the Commission may if public interest will be served thereby, make a conditional grant of one of the applications and designate all of the mutually exclusive applications for hearing. Such conditional grant will be made upon the express condition that such grant is subject to being withdrawn if, at the hearing it is shown that public interest will be better served by a grant of one of the other applications. Such conditional grants will be issued only where it appears:
>
> (1) That some or all of the applications were not filed in good faith but were filed for the purpose of delaying or hindering the grant of another application; or
>
> (2) That public interest requires the prompt establishment of radio service in a particular community or area; or
>
> (3) That a grant of one or more applications would be in the public interest, and that a delay in making a grant to any applicant until after the conclusion of a hearing on all applications might jeopardize the rights of the United States under the provisions of international agreement to the use of the frequency in question; or
>
> (4) That a grant of one application would be in the public interest and that it appears from an examination of the remaining applications that they cannot be granted because they are in violation of the Communications Act, other statutes, or the provisions of this chapter. 47 C.F.R. 47 (1958).

We are unable to discern why the Commission elected not to rely primarily on Sec. 1.362(b), when we remember that in the *Peoples* case the Commission grounded its issuance of the temporary authority on former Sec. 1.385(e), from which the present Sec. 1.362(b) is derived. See *Peoples Broadcasting Co.*, 8 Pike & Fischer RR. 275, 284 (1952). Moreover, Sec. 1.362(b)(3) seems to cover precisely the situation in *American Broadcasting Co., supra*, and Sec. 1.362(b)(2) covers the problem faced in *Peoples Broadcasting* v. *United States, supra*. Lastly, the careful wording of this rule, with its restrictive character, recognizes, in spirit, what the Commission has already said in its decisions. See *Matter of Springfield, Illinois-St. Louis, Missouri*, 15 Pike & Fischer RR. 1525, 1537 (1957). Section 1.362(b) of the Rules and the Commission's previously cautious characterization of that procedure warrant the conclusion that a temporary grant is not only potentially prejudicial to the party or parties not favored but jeopardizes the whole scheme of full comparative consideration. It should be used only in circumstances which meet the Commission's own rules and its own warning that this is an "extraordinary" step.

The case resolves into two questions. The first is whether the Commission has power to grant a temporary authorization which will last for at least 2½ years without a preliminary comparative hearing: (a) where an investment of a quarter to a half million dollars is required, (b) where the area presently has existing VHF television service,[6] (c) where the temporary authority is granted to an applicant whose operations raise questions of concentration of mass communications media (AM, FM and TV at New Orleans) even though the temporary grant on Channel 9 displaces the applicant's UHF operation at Baton Rouge.[7] It seems clear under the *Peoples Broadcasting* case that the Commission has power to issue a temporary authority under Sec. 1.362(b) and under Sec. 309(a) of the Communications Act, without a comparative hearing.

The second question is whether the Commission has compiled with its own Rules and Regulations in exercising its power under those controlling provisions.

---

[6] It is undisputed that Baton Rouge will still have service from one Baton Rouge VHF station. Appellant further contends that there exists, at present, service reaching Baton Rouge from New Orleans. Since the Commission made no findings on this point, we cannot comment on its effect, although if the allegation is true it is obviously relevant.

[7] Intervenor controls WDSU Broadcasting Corp., operator of a VHF Station at New Orleans, and signals of intervenor on Channel 9 at Baton Rouge would overlap with the operator's VHF station at New Orleans.

Considering the importance of its action and its impact both on intervenor, who will assume large risks of investments and obligations, and upon more appellant whose competitive position in the comparative hearing for a construction permit is or may be worsened, the Commission's utterances in support of its action are indeed laconic.[8]

The reasoning of the Commission is expressed only in a letter to appellant, but not in any findings; its position is that since it had been determined in the rule making that two VHF stations were desirable at Baton Rouge in place of one VHF and one UHF station, the need at Baton Rouge was both imperative and immediate. There is no indication that the Commission considered the problems arising out of the common ownership in the form of possible overlap of coverage or concentration of mass media. Nor is there any finding or discussion of why the need for the added television service is both imperative and immediate.

That its rule making proceeding has determined the general and broad questions does not relieve the Commission of the obligation to relate the instant action to the prior rule making in a meaningful way. The factual and legal issues involved in granting the S.T.A. are not whether a new channel is *ultimately* necessary, but whether the service in question is *so* immediately and imperatively necessary that it must be granted at once in spite of the great financial risk of one party and the possible prejudicial effect on the other who is not favored, and the derogation of the whole comparative hearing concept. The exercise of this "extraordinary procedure" demands an inquiry and findings as to the television condition at the present time in Baton Rouge; it demands consideration and discussion as to whether the existing service is adequate until the comparative hearing is concluded; and it demands consideration and discussion of the overlap and concentration problems.

This is not a matter merely of form; it is substantive. The findings must also show how and why the public interest requires the added interim TV service while it hears and considers the competing application over the 2½ year period; of course there must be some evidence to sustain the findings. *Radio Station KFH Co.* v. *Federal Communication Commission*, 101 U.S. App. D.C. 164, 166, 247 F. 2d 570, 572 (1957); *Secretary of Agriculture* v. *United States*, 347 U.S. 645, 654 (1954). If such inquiry has been made, or the criteria in Rules Sec. 1.362 (b) applied, it is not revealed in any expression adequate for judicial review. The dissenting opinion of Commissioner Cross rests on the proposition that these factors had not been considered.

Though the intent of Congress was to fill the gaps in VHF service throughout the country, we cannot conclude that Congress demands it be pressed in such haste that either all the relevant factors are not considered, or if considered that they are not articulated in meaningful findings.

We hold that the procedures for granting a Special Temporary Authority to one of several competing applicants pending a comparative hearing must include such inquiry as is needed to make comprehensive findings on all relevant factors,

---

[8] "The Commission en banc, by Commissioners Doerfer (Chairman), Hyde, Bartley, Lee, Craven, Fort, and Cross, took the following actions on July 22:

* * * * * * *

"WAFB–TV, CHANNEL 28, MODERN B/CG CO. OF BATON ROUGE, LA.

"Granted special temporary authority to operate on Channel 9 pending final action on any applications for regular operation on that channel; no effect to be given in any comparative hearing to expenditure of funds or preference as a result of such temporary operation. By letter, denied opposition by AM station WIBR, Baton Rouge. Commissioner Cross dissented. Modern is applicant for Channel 9 which was shifted from Hattiesburg, Miss., to Baton Rouge July 6. Modern's temporary Channel 9 operation will be with ERP of 24.1 dbk (257 kw) visual and 21.3 dbk (135 kw) aural; antenna height 500 ft. Community B/cg Co. (WIBR) has since applied for regular operation on Channel 9. * * *"

Commissioner John S. Cross dissented.

This was followed by a letter in July 1959 to appellant advising of denial of its application for a stay of intervenor's special temporary authorization. This letter contains the nearest thing we can discern in the record to a finding of public interest:

"In our Report and Order in Docket No. 12281 (FCC 59–509) we determined that the public interest would be served by reassigning Channel 9 from Hattiesburg, Mississippi, to Baton Rouge, Louisiana, in terms of improving the competitive situation in this relatively large market and in terms of providing additional service to populations in need of it.

"We believe that it is equally in the public interest to expedite the advent of a second VHF service at Baton Rouge at the earliest possible time, thereby speeding the improvement in the television situation in the area by enabling the public to receive an additional VHF service * * *."

including, but not limited to, the basis of the "public need," and, where appropriate, the question of concentration of mass media, in situations where (a) the public already has some service, or (b) where the "temporary" operation may well last, 2 or 3 years, or (c) where the investment of the "temporary" operator is so large as to make his failure to prevail in the comparative hearing oppressive on him. We do not think the public interest demands or that Congress has commanded that the public domain of the airwaves be filled at the earliest possible moment in all circumstances without due regard for these important factors.

The Special Temporary Authority issued to the intervenor is vacated and the matter is remanded to the Commission for further proceedings not inconsistent with the views here expressed.

Vacated and remanded for further proceedings in the Federal Communications Commission.

DANAHER, *Circuit Judge*, dissenting: A petition was filed with the Commission in October, 1957, for the institution of rulemaking proceedings looking to the reassignment of VHF Channel 9 from Hattiesburg, Mississippi to Baton Rouge, Louisiana.[1] The Commission on June 1, 1959, adopted a Report and Order amending its nationwide table of television assignments by shifting Channel 9 to Baton Rouge. The public interest determinations upon which the action was taken appear in 18 PIKE & FISCHER RADIO REG. 1666, 1669–1670 (1959). The result of the rule-making is not here challenged.

On Jun 15, 1959, intervenor Modern filed an application for a construction permit on Channel 9 at Baton Rouge. On June 18, 1959, Modern asked for special temporary authorization to permit immediate use of the channel. No other application for any type of service on Channel 9 was then before the Commission. Modern expressed its complete willingness to accept the STA conditionally.[2]

47 U.S.C. §§ 308 and 309, of course, apply to any STA. If upon examination of the pending application the Commission could find that Modern qualified under section 308(b) and that section 309(a) requirements could be met, the Act says the Commission "shall grant such application." After the rulemaking proceedings had gone forward nearly two years and had clearly established the need for the shift of Channel 9 to Baton Rouge, with the qualifications of Modern already established as it was a licensee on Channel 28, with the pending application disclosing whatever additional data might be required, with only one request before it for an STA, the Commission granted temporary authority to Modern.[3]

Community filed no protest under 47 U.S.C. § 309(c) as the Act clearly would have permitted it to do. Although previously Community had indicated that it *might* file an application of its own for an STA, it did not do so.[4] It did file a petition for reconsideration under 47 U.S.C. § 405, only to withdraw it without giving the Commission a chance to pass upon whatever contentions it might choose to submit. I suggest that Community has no standing whatever in this court.[5]

In granting the only pending application for an STA, the Commission not only recognized the stipulated terms suggested by Modern but incorporated them into its order. Both Modern and the Commission are bound by them, and "until and unless the contrary is shown, we must assume that the Commission will act in good faith * * *."[6]

---

[1] Some measure of understanding of the Commission's problem with respect to VHF and UHF allocations may be gleaned from Owensboro on the Air, Inc. v. United States, 104 U.S. App. D.C. 391, 262 F. 2d 702 (1958) and the cases cited in our footnotes, *cert. denied*, 360 U.S. 911 (1959).

[2] Modern noted that if given permission for interim operation on Channel 9 it would be "willing to conduct such temporary authorization under the express condition that it will expire automatically upon the commencement of any regular operation * * * by a permittee so authorized by final action of the Commission * * *." It also stipulated that "no effect whatsoever shall be given to any expenditure of funds * * * and no preference shall be accorded to us by virtue of the grant * * *."

[3] Cf. Peoples Broadcasting Co. v. United States, 93 U.S. App. D.C. 78, 209 F. 2d 286 (1953).

[4] It did file an application for a construction permit before the STA was issued.

[5] See Unemployment Comm'n v. Aragon, 329 U.S. 143, 155 (1946); Albertson v. FCC, 100 U.S. App. D.C. 103, 243 F. 2d 209 (1957).

[6] Peoples Broadcasting Co. v. United States, 93 U.S. App. D.C. at 81, 209 F. 2d at 288.

Thus Modern and Community have before the Commission copending applications for a construction permit. The applications are mutually exclusive and an *Ashbacker* hearing must ensue. It may be a matter of years before that hearing can be concluded. Interim service meanwhile can be provided by VHF Channel 9 at Baton Rouge, the public need for which was long since demonstrated and is not under attack. The Commission evolved a practical, and in my view, a proper solution of the problem before it without the slightest impingement upon the respective rights of Modern and Community. The end result, on the other hand, gave the public the benefit of an early and competitive VHF service in Baton Rouge, quite in accord with the rulemaking determination. I think the Commission action furthered the purposes of the legislation. On the record here made, we should not substitute our judgment for that of the body whose duty it is to administer the Act. I would dismiss.

Senator PASTORE. Now, let me ask you this question: Insofar as the determination of the policy itself is concerned, will that be too long? You have extended it now to May. How long after that would you get a determination on that?

Mr. HYDE. I should think the determination could be made promptly after the material is submitted.

Mr. COX. You have had these studies since last April that Commissioner Ford mentioned. Within the Commission you already have available certain information on this subject.

Mr. HYDE. But, as you know, the Commission will expect, and would be required, to give very earnest consideration to all of the materials that are submitted. It is a form of hearing. True, it is rulemaking, but it does contemplate a record, and the Commission will have to give reasoned opinions on its disposition of every argument.

Senator PASTORE. In the decision you make after you have perused the record and all of the information that is submitted to you, will your decision be final, or is that subject to litigation as well?

Mr. HYDE. Any decision we make is subject to litigation.

Senator PASTORE. I mean could they forestall——

Mr. HYDE. Senator, our discretion in rulemaking is much better than in licensing.

Senator PASTORE. Well, that is what I meant. We wouldn't expect here—let's assume if you gave it very careful study and reached a decision that this policy were feasible—that we would have this thing dragged all through the courts right up to the Supreme Court?

Mr. HYDE. There are possibilities of litigation. I think that while our discretional authority in rulemaking is very broad, nevertheless this kind of action would tend to curtail—it would shorten separations which certain licensees now enjoy, and in that sense would tend to be a qualification on present licenses.

Senator PASTORE. We are always up against the proposition, if there were a change of membership tomorrow, of the four to three marching the other way.

Mr. COX. This last point you make—you would not in any way impair the existing licensee's right to continue to broadcast at his authorized power and antenna height. The effects upon his coverage are something to which he is subject simply from the granting of a new station at existing separations.

Mr. HYDE. But, Mr. Cox, you will remember that when the Commission authorized an experimental operation in New Orleans, to test the use of directional antennas and to actually get data as to the effects

of operation at distances less than what had been standard, our action was stayed by the court on a very, very marginal showing. Actually, the basis of the stay was that we had violated the separations.

Mr. Cox. Not having previously changed them, as you now propose to do?

Mr. Hyde. That is right.

Mr. Cox. Now, in this notice of proposed rulemaking, the Commission sets forth four conditions to the waivers that it might consider, the first of which is that the assignment proposed should make possible a second or third VHF television station in an important market. Now we, of course, heard testimony on Tuesday from Congressman Ayres objecting to this and to your precluding other possibilities. What about this question of the assignment of a first V station to overshadowed communities such as Trenton, or Allentown-Easton, which have no stations, or Akron?

Mr. Hyde. I would like to discuss some of the considerations I think are relevant here, although this document was released in my absence, and I think some of the other Commissioners will want to air their views; but let me mention some of the considerations which I think are relevant here.

Network broadcasting has conspicuously been the basis of the development of television service. You have observed, from witnesses that have come here, that the network affiliation is in most instances essential to the successful operation of the statoin. Actually, it was network television that brought about the expansion and development of television as we have it now.

Well that being so, you must give consideration to the opportunity, or the possibilities, for competition within this field if you are going to have a competitive service rather than a tightly regulated one. And also if you recognize, as I say you must, that network television has been the outstanding competitive factor in the field, then apart from what network is concerned, just as a means of encouraging development of the service in its broad meaning, you have to give consideration to what are the competitive opportunities for the factor which is most important in the development of television.

Mr. Cox. How about a possibility of this kind: Suppose that, giving full consideration to this very important factor that you are discussing, the Commission considers and finds it possible to drop in V's at somewhat less than the present separations which would in their view be near enough competitive to the existing stations to provide a meaningful outlet for third network operation.

Now, above and beyond that, would the Commission accept, or does it consider precluding, the filing of petitions by broadcasters, now on the air, or who have gone off the air in some of these other areas, who come in and say that, in addition to this, their engineers tell them that you can drop in a V channel here which will not give them enough coverage that, even though they would not be competitive if they had to face VHF competition in their own community, it will at least give them set-compatability and give them coverage in their principal community?

Mr. Hyde. You are raising one of the serious questions in this type of procedure. Can the Commission solve this problem of providing a better opportunity for competitive network television without sowing

the seeds for a breakdown of separations generally, and can they provide for this more effective competition in network broadcasting without paving the way for movement toward shorter separations which will impair rural coverage and small town coverage? There are a number of things here that will require very careful balancing or weighing, if that is the right word.

Mr. Cox. Well, my question is: You have suggested in this notice that these are at least the conditions which the Commission at this point considers. Is it open to an interested party to file a comment in this proceeding saying that you should further expand this to make possible a filing to take care of his problem?

Mr. HYDE. It certainly is, Mr. Cox. As a matter of fact, the Commission can't preclude interested parties from petitioning for a change in policy; and, as a matter of fact, we must give careful attention to such suggestions. If a reasonable case is proposed, it is our duty to make some determination of it and give valid reasons for whatever determination is made.

Mr. Cox. Well, let's suppose there are some 10 or 12 communities in the top 100 television markets in the country in which there are now 2 V stations operating, and therefore it is the desire of some parties that this be worked out to take care of that deficiency; and there are, I believe, some 9 communities in the top 100 markets which now either have no television stations at all because of overshadowing, or operate single UHF stations under very serious difficulties. Now, is there a possibility of the Commission's confining this interim measure to something on this order without posing the threat, that Commissioner Lee is concerned with, of opening the floodgates and permitting a total destruction of UHF?

Mr. HYDE. The reason for my first discussion was to indicate that I think there are reasonable bases for making some—we might call it classification, or establishing a basis for what we will call an interim basis. In other words, I do not think that the filing of additional petitions to solve problems in a number of cases would necessarily prevent the Commission from making some improvement in a more general situation.

Well, let me put it more specifically. I do not think that the filing of petitions to relieve a number of local problems should prevent the Commission from doing something constructive in respect to network competition.

Mr. Cox. In connection with your rulemaking, you also ask for comments on proposed revisions of engineering standards bearing on calculation of station service areas. Now, assuming that these are finalized, will the requirement, for instance, as to principal-city service apply to existing stations?

Mr. HYDE. I do not want to judge the rulemaking, but I will mention this, that in many instances where the Commission has adopted a new policy or a new rule, they have found it possible to except some existing operation. This was done in the issuance of the sixth report. There were a number of instances where the separations were less than the standards which the Commission undertook to apply for the future. I think there were about 30 of them.

Mr. Cox. I had in mind, for instance, is this going to necessitate—unless you waive it—consideration of petitions for increased power or increased antenna height from existing stations operating now at some distance from their principal city, to permit them to meet the higher standards you are setting?

Mr. HYDE. I would say not necessarily; having some kind of "grandfather" clause to take care of an existing situation is common in administrative rulemaking.

Mr. Cox. You indicated in your statement of last April that the Commission is considering the general allocations proceeding involving the spectrum between 25 and 890 megacycles. What is the status of that proceeding?

Mr. HYDE. The record was closed, and the data that was submitted is in the process of analysis. There have not been any definitive judgments.

Mr. Cox. Can you close it until you decide what to do with the frequencies in this area that are allocable to television?

Mr. HYDE. Yes; we can. Personally, now, I am giving an individual viewpoint here. I have thought we should try to solve this TV problem within the frequencies dedicated to television. That could be done if that procedure were followed; it would have no bearing on the final decision in the 25-to-890 proceeding.

I would say this, that it is regular practice to conduct a sub-allocations proceeding. By that I mean an allocation proceeding having to do with a particular part of the spectrum, without necessarily opening up the whole schedule of allocations to adjustment.

Mr. Cox. I would gather from things Mr. Lee has said, and from other sources, that there are, of course, claims made in this proceeding that other important services are now overloaded in the frequencies allocated to them, and perhaps suggestions that we can't afford 82 channels for television.

Mr. HYDE. The usual approach in one of these proceedings is for a group of users or potential users to tell us that they have to have a given amount of space, and that the FCC must find it for them. It isn't typical of them to ask that a particular part be reassigned, although that does happen. We have both types.

Mr. Cox. In the statement submitted by the majority of the Commission last April, there are set forth the advantages of an all-UHF system which had been set out earlier in the Commission's report and order of June 26, 1956, and these apparently are recognized as continuing valid advantages of an all-UHF system; and in 1956 the Commission called on the industry for an all-out expedited research and development program, which the record amply demonstrates has never really taken place. Is it the majority's feeling, in joining with Commissioner Lee, that you can now perhaps make up this deficiency through the investigation in New York?

Mr. HYDE. I think that my observation would be that this request for an appropriation, and this proposal to spend public moneys, has arisen out of the experience of the Commission in this field, and that it is a judgment of the Commission as to what should be done now.

Mr. Cox. You stated in your April 1959 report that you had undertaken to ascertain the current status of the UHF equipment development and found that such development was continuing very slowly

because of the generally unfavorable outlook for UHF. Would you believe this still to be the case?

Mr. HYDE. I am going to ask another member of the Commission to discuss this. I would like to make an observation on my own part, first.

Earlier, at the time of these earlier hearings, as the record will show, I had urged a greater emphasis on the use of ultrahigh, and I had urged some changes in the allocation as of that time for the purpose of setting up allocations conditions conducive to the exploitation of the ultrahigh channels and providing incentive for the development of equipment.

I thought then that if the allocation favored it more, and if it favored it in a substantial number of places, it would be an incentive to the manufacturers of sets. Well, you know that the trend has been toward more extensive use of VHF.

Mr. Cox. Only 6.9 percent of sets manufactured in 1959 were all-channel.

Mr. HYDE. Your question is as to what has happened to the development of techniques for the use of ultrahigh. I have known of some developments in it; I think perhaps Commissioner Craven could give you more specific information.

Mr. CRAVEN. I have been out of the country so long that I am not current with what has happened in the last 6 months, but prior to that time there were certain developments by certain of the larger manufacturers in fields other than television which gave promise, if adapted to television, of giving considerable improvement in receivers.

However, those very same companies felt there was not enough market for UHF for them to go ahead with a research plan. What has happened since, I am not certain.

Mr. Cox. It is true, as indicated by the updated fiures attached to the majority's statement now, that the percentage of total production which is devoted to all-channel sets is now down to an alltime low of 6.9.

Mr. CRAVEN. It has been decreasing all the time.

Mr. Cox. The Commission, in the report of last April, discussed the contention made by supporters of UHF that the only way to do this is to do it, that if you decide to make the move, the manufacturers will produce the equipment and you will get the improvement that the Commisison has been seeking, and the majority concludes that it can't initiate such a move until it has strong evidence the UHF can provide service substantially equal to that on VHF without requiring a major increase in outlays by the public. Does this mean that the majority feels it can't initiate such a move until there is in being UHF equipment, both transmitting and receiving, which would nearly equalize VHF coverage?

Mr. CRAVEN. I don't know that I can speak for the majority, but I would like to speak to that point. In the first place, I would like to have it understood, and I believe the majority will agree, that we are open minded; we haven't any closed mind on this matter. Also I think we all agree that nothing is impossible to do if you are willing to pay for it.

Now, I have been going on the premise that the Commission should not request the public to scrap their VHF–TV receivers and require

them to purchase UHF–TV receivers, possibly at a higher cost, unless the UHF service is equal or better in technical quality than VHF.

Now, I find it very difficult at this present time, based upon information that we now have, to make a decision that UHF is equal, or better, from a technical standpoint than VHF. Therefore, I think it would be reprehensible to decide today that we would go to UHF in 3 to 5 years.

I also recognize that 12 VHF channels is not enough for the future, and that we do require more television channels. Therefore, I am supporting very, very strongly the two courses of action: First, ascertaining once and for all, with good reasons, whether the Government can give us more VHF channels; we haven't finished that, and I think we ought to push that to a conclusion.

Senator PASTORE. No matter what the answer is.

Mr. CRAVEN. That is right. I am not as pessimistic as some of the others, but I am not overly optimistic; but I hope to participate in some of the further negotiations, and I want to be satisfied, and I think it is the duty of the Commission to become satisfied before we tell the Congress it is impossible to do.

Now, second, at the same time, I want to explore the possibilities as to how, if we have to go to UHF, how to make it better than it is, and what will the cost be. I highly endorse these experiments, and I hope they will include the development of a UHF receiver, so we will know something about the cost, the performance, and things of that sort. I think that is necessary to do, and I think the Commission will support me in that.

Now, at the present moment, I think it would be reprehensible if we acted too hastily. I am not concerned about it taking so long, insofar as I am responsible for it. I want to be sure, and I think the public is entitled to a confidence that what the Commission proposes is based upon sound judgment, sound facts, and adequate facts, and I don't think we should move too hastily. I think we should be absolutely certain.

Mr. Cox. It has always been my understanding that the Commission assumed in 1956 that its decision to move all, or a substantial part, of television to UHF would not depend upon the development of actual equivalence between a VHF and a UHF transmitter, and that therefore, unless it has changed its position, it is in all of these proceedings contemplating the ultimate necessity of facing a decision even though it can't switch off the VHF transmitter and switch on the UHF with absolute coextensive coverage?

Mr. CRAVEN. First, I want to call your attention to the fact that I was not on the Commission at the time they put out that report, so I can't speak for what the Commission did or did not do.

Mr. Cox. Is that not a sound expectation that UHF—even if you use parametric amplifiers, even if you use the other improvements—that it is inherent in the frequencies themselves that unless a totally new breakthrough is made, you would not expect them to equal the low band V?

Mr. CRAVEN. As I said before, there is nothing impossible if you are willing to pay for it. We can have equivalent coverage, and equivalent technical quality in UHF, if we are willing to pay for it.

That means research, and maybe multiple transmission. Nothing is impossible. It may mean better service than we know about today. I think these tube developments they have are all possible, and if there is any incentive at all on the part of the American industry to produce it, it can be done. We can make UHF as good, technically, as VHF, but at what cost I am not certain.

Mr. Cox. Am I correct in my understanding, from the demonstration Mr. Cowperthwait made on Tuesday, that even the proposals of the Commission for a 50-channel VHF service, or certainly a 25-channel VHF service, would involve, because of the adjustments necessary, some loss of existing service as it is now obtained?

Mr. Craven. Yes, some loss, it is true. With 25 channels or with 50, not as great a loss, under the present concept, as with UHF.

Mr. Cox. That loss, like the loss encountered if you shifted to all UHF, would have to be made up, if it can be made up, either through the building of new stations, in new communities where they don't now exist, or through the peripheral efforts of viewers to get service through translators or community antenna systems?

Mr. Craven. You are stretching this a little too far, I am afraid. In my opinion, if you go to the 25-channel system, it is possible to have receivers almost as good throughout the whole band as the present 12-channel receivers—very little difference—and perhaps at commensurate cost. It is also possible, by the addition of a little power on the upper channels, to equalize the coverage potentialities.

Mr. Cox. What range of power as compared to 316 kilowatts?

Mr. Craven. About another 100 kilowatts, I think, would do it.

Mr. Cox. It would not have to be beyond the range of that now authorized for UHF?

Mr. Craven. That is right.

Mr. Cox. My question is whether, with that increase in power and with sets of that sensitivity, the Commission will still not be faced with the fact that while areas will be created by any of these plans, which would have to be filled either by new stations or by extension of service through these supplemental means?

Mr. Craven. That is true to a limited extent as compared to UHF.

Mr. Cox. But would exist in some degree?

Mr. Craven. Some small degree.

Senator Pastore. We went a little longer with the Commission than we had anticipated and I don't want Mr. Beckman to be squeezed or cramped in any way—and he will be if we ask him to go on now.

The Commission is excused. We want to thank you for your presence here and your cooperation in these hearings.

We will reassemble at 2:30 to hear Mr. Beckman.

(Whereupon, at 12:32 p.m., the subcommittee recessed until 2:30 p.m., the same day.)

AFTERNOON SESSION

Senator Pastore. Come forward, gentlemen. To say the least, this is a very distinguished array of experts.

All right, Mr. Beckman, you may proceed.

Mr. Hinckley. Mr. Chairman, I wanted to make a short statement.

For the record, my name is Robert H. Hinckley. I am a director and a member of the exceutive committee of the American Broadcasting-Paramount Theaters Co., Inc.

I joined the company during its transition period from the Blue Network to the American Broadcasting Co. Ever since then, since 1946, I have been associated with Messrs. Beckman and Marx in allocations problems. We had allocations problems even in radio in 1946, and, as you will recall, a clear channel proceeding was instituted in 1945 that has not yet been resolved.

Mr. Marx is vice president of our company, and chief engineer. Mr. Beckman, in presenting the views of our company on this allocations problem, will identify himself.

I join you in the hope that something will be done, that something will come from these hearings that will bring about a truly competitive national television network system.

Further, I join you in the hope that these "exercises in futility" will cease, and that something be done now so that these great national resources, these unused channels, will no longer be wasted.

Senator PASTORE. Thank you very much, Mr. Hinckley.

All right, Mr. Beckman.

STATEMENT OF ALFRED R. BECKMAN, VICE PRESIDENT, AMERICAN BROADCASTING CO.; ACCOMPANIED BY FRANK MARX, AMERICAN BROADCASTING CO., VICE PRESIDENT IN CHARGE OF ENGINEERING; AND ROBERT H. HINCKLEY, DIRECTOR AND MEMBER OF THE EXECUTIVE COMMITTEE OF AMERICAN BROADCASTING-PARAMOUNT THEATRES, INC.

Mr. BECKMAN. Mr. Chairman and members of the subcommittee, my name is Alfred Beckman. I am vice president of American Broadcasting Co., in charge of its Washington office, but for a number of years and until very recently I was ABC vice president in charge of television station relations. It is principally because of my experience in that capacity—which brought me a considerable knowledge and understanding of how the lack of facilities in many areas of the country deprives some of our citizens of the choice of programing that is available to the rest of the Nation—that I am appearing before you today.

With me is Frank Marx, ABC vice president in charge of engineering, who is here to answer any questions that you may have on the engineering aspects of television allocations.

ABC appreciates the opportunity to present its views on providing more television service to the American public. As the operator of a national television network and of five television stations, we have a vital interest in television allocations.

Since the time of the Potter hearings in the spring of 1954 it has been evident that the present allocations system of intermixed VHF and UHF channels will not work, and that fundamental allocation revisions are needed to provide the television service to which the public is entitled. Six years have gone by and we are not appreciably nearer an overall solution than we were in 1954. Everyone on this committee knows that the ultimate solution requires either a substantial number of additional VHF channels, taken probably from Government use, or that means must be found to make effective use of the UHF channels. All the research and studies by the Commission and

the industry have not enlarged the available alternatives. Either solution will take at least a decade before it can be made fully effective.

This committee and the Commission are properly concerned with the long-range aspects of television allocations, for we must plan not only for today, but for 10, 25 and even 50 years ahead. We at ABC have actively participated with the Commission and industry representatives in seeking a solution for the future and we will continue to do so. However, there is also the immediate problem. What can be done now to improve television service within the framework of the existing allocations system while we await the adoption and implementation of the long-range solution?

It is certainly high time that a serious effort be made to correct existing deficiencies utilizing techniques now available.

What can be done now to improve service in the undeserved major population centers of the country?

The need for vigorous interim action was recognized by the Commission in April of last year. On January 7 of this year following detailed studies, the Commission released a notice of proposed rulemaking looking toward mileage reductions, with adequate safeguards to protect existing stations, as the means of providing additional VHF channels in the major underserved population centers. Comments in this rulemaking proceeding are due in April. ABC will participate in the proceeding and will make a number of specific recommendations.

We know now that we are in general agreement with the proposals which have been advanced by the Commission. We wish to commend the Commission for its action and also for more recent proposals announced just last week for the assignment of additional VHF channels in the important cities of Providence and Grand Rapids-Kalamazoo. Our engineering department has already made a study of the proposed new coverage and protection rules, and has advised that they are workable and sound.

Mr. Cox. In that connection, Mr. Beckman, is it your opinion, and Mr. Marx' opinion, that the stations which will be made possible under the sort of waiver of the separation rules and the new engineering standards that are being contemplated would be competitively comparable to the existing stations, despite the limitations that might have to be placed on their power, or directionalization of their antennas, in order to protect existing stations?

Mr. BECKMAN. We believe that. They will not be fully competitive, of course, because of certain restrictions; but the metropolitan area will be served, and the major population area of those particular markets will be served, and certainly whatever it is it will be so much better than what exists now, which is nothing.

Mr. Cox. It will, then, be a facility that at least will serve the city with which you are primarily concerned?

Mr. BECKMAN. That is correct, and maybe Mr. Marx has additional information he would like to supply. I have seen the engineering—I am not an engineer, but I have seen the curves—and I am convinced it will not be fully competitive, but sufficiently competitive to be worthwhile.

Mr. Cox. And permit stations which national advertisers would buy, which could be equalized by minor adjustments in rates or matters of that kind?

Mr. BECKMAN. Yes.

Senator PASTORE. As a matter of fact, it will assist your network to come in in some regions where you are now excluded; isn't that a fact?

Mr. BECKMAN. That is exactly right.

Senator PASTORE. Isn't that what you mean by competition?

Mr. BECKMAN. That is exactly right.

Senator PASTORE. It is ABC's position that you have been excluded from certain markets, thereby not making available to the viewers of this country programs in which they might be interested, only because the contracts of the existing stations are with other networks?

Mr. BECKMAN. That is correct.

The Commission's proposal is essentially similar to a plan which ABC proposed to the Commission in June 1958.

The Commission's recent actions deserve commendation, but the Commission also needs vigorous encouragement to continue in the course which it has charted. There are still potent forces which will seek to frustrate or, at the very least, delay the Commission's proposals. These are the interests which are very well satisfied with the status quo. If they are to be overcome, the Commission must press forward vigorously with firmness of purpose; and this committee must remain vigilant that the forward momentum, which has at last been attained, not be lost.

Two Commissioners dissented from the Commission's notice of proposed rulemaking because they are concerned that the proposed interim action may prejudice a long-range solution. We do not believe that the Commission's proposal will have this effect. The Commission has proposed that VHF assignments at reduced separations will be made only in those markets where there is a pressing need and where VHF is firmly established.

These markets are already completely saturated with VHF-only receivers. The addition of another VHF station in VHF-saturated areas would not adversely affect either UHF stations or the distribution of UHF receivers and thus could not aggrevate the difficulty of a later transition to a UHF-only or to an intermixed system.

Senator PASTORE. Now, Mr. Marx, I want to ask you a question on this paragraph. In what way will a long-range solution be prejudiced by giving more service in some of these communities?

Mr. MARX. We don't believe it will. I can see no way in which it would.

Senator PASTORE. Can you imagine that in any way this would disrupt or prejudice a long-range solution?

Mr. MARX. No, sir.

Mr. Cox. If they ultimately decide that all-UHF, or certainly increased utilization of the UHF, is the direction in which they must go, the fact that, meanwhile, there have been 8, 10, or any number of markets converted into competitive, 3-station VHF markets would not impair their ability to make that adjustment?

Mr. MARX. It would not impair it in any way, in our opinion, and we are very much concerned about this subject. We have been since we made our initial filing with the Commission and proposed the ABC plan.

ABC, as you know, owns and operates five television stations among the six top markets of the country. We are also interested to see that the public continues to get service from those stations, and therefore whatever plan is adopted, the ABC plan we presented to the Commission we believe adequately protects the service to the public to the extent possible.

Mr. COX. In other words, you can see that the Commission, perhaps, has a theoretical problem here, that when it starts waiving what has heretofore been just an absolute prohibition there may arise instances, of varying persuasiveness, where they might be asked to do this, so that they have the problem of drawing variable lines, where heretofore they have had an absolute one; but in your view is there anything here that cannot be solved simply by a careful definition of what it is they are trying to do?

Mr. MARX. We believe it can be solved, and I am not sure that the lines necessarily have to be variable. I think they can be well established, and fixed.

One of ABC's concerns, when we first began to study this problem many years ago, was the effect of creeping paralysis, and we believe safeguards have been and can be established to prevent this creeping paralysis problem.

Mr. BECKMAN. The opponents of the Commission's plan will seek to paint a dismal picture of a host of new stations assigned at increasingly reduced separations which would hopelessly complicate future reallocation. They will be avoiding the issue in attacking a plan which has not even been suggested.

While the total impact of the existing monopoly and duopoly markets upon the national competitive structure is severe, this does not mean that, for immediate purposes, a major overhaul is required. In its nationwide aspects the problem is limited to the important markets.

While this solution may appear to be limited in terms of number of markets, it nevertheless involves very considerable numbers of television viewers.

For example, in Grand Rapids-Kalamazoo, Louisville, Syracuse, Rochester, Birmingham, Raleigh-Durham, Charlotte, Providence, Jacksonville, and Wheeling-Steubenville—all two stations markets, although not the only duopoly markets—we find in the aggregate more than 4 million television homes where the viewers are deprived of a full choice of three-network service.

Mr. COX. Would that constitute something just short of 10 percent of present television homes?

Mr. BECKMAN. That is correct.

The exclusion of most ABC–TV programing from these markets makes it difficult for ABC–TV to effectively compete with the other networks. Of even greater importance, however, is the fact that viewers in major markets with only two channels are being deprived of the opportunity to view worthwhile network public service and other programing as a result of the shortage of time in these markets for the programing of all three networks. In the month of December,

for example, viewers in 10 of the major two-channel markets were not able to see 60 percent of the public service and special telecasts presented by all three networks in December 1959. This is shown in exhibit 1 attached to my statement.

Mr. Cox. That was an impact that was felt, as I understand from your study, not just on the public service programing of ABC. It is not just that you were excluded, but where you were able to sell the popular commercial programs which ABC offers to the stations basically affiliated with other networks, this often operated to exclude their public service programing?

Mr. BECKMAN. That is correct.

In not one of these two-channel markets I have mentioned can more than half of ABC–TV's programs currently be seen by viewers; and less than one-fifth of ABC–TV programs can be seen at their regularly scheduled times in any of these markets. As exhibit 2 illustrates, an average of 61 percent of ABC–TV's programs are not even carried in these markets.

Let's for a moment put ourselves in the position of a television viewer in one of the two-station markets we have discussed. These, after all, are the people whose interests you are looking after.

In Washington, for example, you and I can see "Meet the Press" and "Time: Present"—in Syracuse, you can't. In Washington, our teenagers can see Pat Boone and our children "Leave It to Beaver"—in Rochester they can't. In Washington, we can see Walt Disney, and if we are fight fans, we can see the Wednesday night fights—in Louisville you can't. In Washington we can see "Men Into Space" and "Person to Person"—in Birmingham you can't. In Washington, we can see "College News Conference" and "Adventures in Paradise"—in Charlotte you can't.

Senator PASTORE. I will have to interrupt you, now. A vote is called, and I am a long way from that floor.

(Recess.)

Senator PASTORE. All right, you may proceed.

Mr. BECKMAN. In Washington we can see "World Wide 60" and our schoolchildren can see "High Road," which is incorporated in the curriculum of many schools—in Raleigh-Durham you can't.

Mr. Cox. Here again the impact of this scarcity affects the desirable programs of the other networks in some instances as well as your own?

Mr. BECKMAN. That is correct.

This pattern holds true in all of these two-station markets, and remember, the television set owner there spends just as much for a television set as you and I spend, but his choice of network programing is one-third less than ours.

The majority of the injustices could be eliminated by a relatively few additional assignments. But the specter with which the opponents of mileage reductions will seek to stall off the Commission is that of interference. It is, of course, true that you cannot add additional stations in any service without some mutual interference.

Mr. Cox. In that connection, Mr. Marx, isn't that true, really, with reference to bringing new stations on the air even at established mileage separations? In other words, if a station has been operating with no station on its frequency, because it simply has not yet been built, it may establish a service area which will suffer some restriction when that station comes on?

Mr. MARX. That is correct.

Senator PASTORE. Well, just to take it a step further, when you speak here of interference, when you say "without mutual interference," what kind of interference are we talking about—quality of picture, or interference with somebody else's profits?

Mr. MARX. No; it would be the interference that you see on the television set, which may be a horizontal black bar from time to time moving across the picture—that type of interference.

Mr. COX. Does it destroy reception?

Mr. MARX. Not at the distances we are talking about.

Mr. COX. In extreme cases it might?

Mr. MARX. In very extreme cases, it might.

Senator PASTORE. Well, this of course interests me. I am all for what you said about getting as much as possible for all the viewers, but do you think that one outweighs the other?

Mr. MARX. I am not exactly clear.

Senator PASTORE. Let's take an area where you have two channels and you want to bring in a third, which is very desirable, because I think that eventually, for the competitive factor that is involved, you may have to maintain this competition between the three networks, if all three are to survive.

Now, you say here that you recognize the fact that, in dropping in additional stations, sometimes you are going to have this mutual interference. That disturbs me a little bit, and I think that ought to be cleared up, because the minute you do that, naturally you will have remonstrances on the part of a lot of people whose reception is being interfered with. I don't see how the Commission can look upon that too lightly.

Mr. MARX. I believe Mr. Cox, in the question he asked, sort of pointed it up, and perhaps I didn't make my answer clear.

We presently operate channel 7 in New York. Let us assume that there was no channel 7 station on the air in Washington, and no channel 7 station on the air in Boston. The service from channel 7 in New York would be somewhat greater than it presently is.

When the channel 7 station started operating in Boston, there was some area, out at the periphery of the New York service, that was interfered with, but interfered with not to an extent greater than what the present Commission rules allow.

You are operating, in effect, in a virgin territory, and that territory started to be built up.

Senator PASTORE. Well, now, how do you overcome it? Let's assume in an area where you have two stations operating you bring in the third station. Your argument is that insofar as the other two stations are concerned, along the periphery you may have some disturbance as to the quality of the picture?

Mr. COX. Not as to their picture, is it? This would never create interference as to the other stations in this particular market; it creates interference on the periphery of other stations operating on this channel in other communities, isn't that the problem?

Mr. MARX. That is correct; yes.

Senator PASTORE. Oh, I see.

Mr. BECKMAN. The question presented in television, as in nearly all other allocations matters, is whether or not the need for additional

services does not outweigh the need for the marginal service which will be lost in fringe areas. As its Chairman advised you on Tuesday:

> The Commission has tentatively concluded that new short-spaced VHF stations should be conisdered only in circumstances where it is possible to prevent more interference to existing stations than that to which they would be subjected if cochannel stations with maximum antenna heights and powers were located at the minimum mileage separations provided for in the rules.

ABC concurs with this conclusion.

If these rules, to which the opponents of change cling with such tenacity, have any validity, then surely this level of interference is a tolerable one, provided that the new short-spaced VHF stations are not in themselves so limited by interference that they are precluded from providing an effective service. Our studies indicate that a fair number of additional assignments with effective service areas can be made under the limitations proposed by the Commission. The minimum essential objectives of an interim plan do not require a large number of additional assignments.

Mr. Cox. Would this number of additional assignments be on the order of the markets listed in your appendexes as showing limitations on your service?

Mr. BECKMAN. Yes; those 10 markets represent the major markets of the country which at the present time are underserved. It is not a complete list by any means, to establish a network system, but this group of 10 is more important in terms of population centers currently underserved.

Mr. Cox. Have your engineering studies, Mr. Marx, convinced you that dropins could be so engineered for those markets that the interference would be kept within the limitations the Commission seems to have in mind, and yet provide a reasonably competitive facility?

Mr. MARX. We have completed preliminary engineering studies on six of these Commission proposals, which are fairly new to us. It has taken us some time to digest them and work them out. We have run into no roadblocks up to the present time and we have no reason to believe there will be any.

Mr. Cox. Your earlier proposal involved 10 or 12 communities, and you had proposals which, as I recall it, you represented to the Commission would permit the protection of the existing facilities with very minor reduction in separation?

Mr. MARX. That is right. That is one of the reasons we believe that our studies will show no roadblocks, proven by experience.

Mr. BECKMAN. The adherents to the status quo will seek to cast doubt even upon the Commission's cautious proposals and conclusions. It will be argued that our knowledge of television propagation, interference, directional antenna performance, receiver performance, precision offset and other techniques for reducing interference is not as extensive nor as precise as we would like and that until it is we must maintain the existing separations no matter how imperative the need for additional stations may be. If the Commission and the industry had indulged in a similar attitude in the past we would still be waiting for the first picture on our TV tube. This is not to suggest that recklessness is any more justified than extreme caution. The fact is, however, that the limitations of our present knowledge have been greatly exaggerated.

With respect to directional antennas, for example, it will be argued that performance is so uncertain that any reliance upon their use for purposes of reducing interference would be unjustified. This argument seriously misrepresents the state of our own knowledge and is in clear conflict with informed engineering opinion. Even before the adoption in 1952 of the existing plan there was considerable expert support for the use of directional antennas. Directional antennas are presently being used in the VHF band and have been used for years with marked success. Aircraft flying over the United States today are guided by the omnidirectional radio range. This system employs a very complex directional antenna in which an especially high degree of accuracy is required in order that the planes may maintain their scheduled courses with a minimum of risk. The airplanes do indeed fly the courses established by these radio range beacons. They fly them over distances comparable to the distances with which we are concerned in television, namely, 100 up to 200 miles. One finds no evidence that the courses established by these range beacons are inclined to be erratic or to wander.

The opponents of the use of directional antennas in television are the same breed of status quo adherents who, 30 years ago, insisted that radio directional antennas could not be made to work. There is no reason why we should deny ourselves the benefits of technical advances.

It must also be pointed out that the Commission's proposals contain a safety factor against excessive interference in that they do not take into consideration the use of the new technique of precision offset, which gives real promise of further substantial reduction in mutual interference between cochannel stations.

Mr. Cox. Didn't TASO find there was real promise in the use of precision offset?

Mr. MARX. Very substantial. As a matter of fact, almost to the extent of the use of the directional antennas that ABC proposed in its original filing.

Mr. BECKMAN. It must be conceded that as yet we have had relatively little experience with precision offset and that someday we will know more about this technique. The fact is, however, that precision offset today is at substantially the same stage of development as were the present offset techniques at the time they were adopted by the Commission as an allocation tool in 1952.

We support these proposals both as a network and as the owner of stations located in five of the top six markets of the country, serving 25 percent of the Nation's population. Certainly we are interested in protecting the service provided by these stations. You can be assured that the engineering proposals made by ABC and the engineering proposals recommended by the Commission in its notice will protect existing service. In fact, as new engineering techniques, including precision offset, come into use, the service now provided by existing stations can be extended even in those instances where channels are fitted in at reduced mileage.

It will also be argued that mileage reductions should not be undertaken because it is uncertain whether they will produce more than a small number of effective additional assignments. ABC is convinced that enough new assignments can be found to make a very substantial

difference in the television service provided to millions of American television homes and to establish at least the minimum framework of a fully competitive nationwide television service.

Assuming that the Commission perseveres in its proposed course and that within a reasonable period additional VHF channels are allocated to the major problem markets, there will still remain a major obstacle to obtaining television service. This is the inordinate delay which occurs between the time a new channel is allocated and the time a new station takes the air.

Since the new allocations will be to major markets, they will represent valuable franchises and undoubtedly there will be multiple applications for each of them. Some of the new VHF channels allocated under the Commission's current interim policies have produced as many as seven competing applicants. Where there is more than one application for a channel, a comparative hearing must be held to select the winning applicant. These comparative hearings usually take several years. Meanwhile, in many cases, the channel remains vacant and the public is denied the additional service to which it is entitled.

I'd like to show you the seriousness of this problem. During the first 6 months of 1957, the Commission added VHF channels to Miami, Terre Haute, Davenport-Rock Island-Moline, Louisville, Lake Charles-Lafayette, Tampa-St. Petersburg, and Beaumont-Port Arthur. Not a single one of these channels is yet on the air and most of them are not even close to being on the air. If the Commission expedites the new allocations, and if the comparative hearing delays are comparable to those encountered in the past, the benefits of the new allocation policies will not be realized for 3 to 6 years.

In some instances the Commission has been able to permit a new service to be established without undue delay. The procedure used is to grant temporary authorizations either to an existing UHF station in the market or to a specially organized trustee corporation. In either case, the temporary authorization is solely for the duration of the comparative hearing, which determines who will be the ultimate licensee. By these means additional television service has been established with relative promptness in Albany-Schenectady-Troy, New Orleans, Shreveport, and elsewhere.

There are, however, substantial limitations. In many instances there is no operating UHF station to which the new channel could be assigned and frequently the competing applicants are unable or unwilling to agree on the formation of a trustee corporation. However, the principal purpose of the new assignments is to provide additional television service to the public and the public's right to have that additional service established as promptly as possible must be the primary consideration. ABC urges this committee to encourage and support the Commission in the use of special precedures which will shortcut delay with due regard, of course, for the rights of competing applicants. We suggest that the Commission be advised by resolution or other appropriate means that it is the sense of the Congress that trusteeships and other special temporary authorizations should be utilized to the fullest possible extent to expedite the construction and operation of stations on any newly assigned VHF channels.

Mr. Cox. You heard the discussion with Commissioner Hyde this morning. Is there anything you or Mr. McKenna can suggest as to

any way in which the Commission could tighten up its procedures to induce agreement to trusteeships in this kind of situation, or is it going to have to be left to the willingness of the applicants to cooperate?

Mr. BECKMAN. I am not a lawyer, Mr. Cox. I would defer to Mr. McKenna in this particular area.

Mr. MCKENNA.[1] I am inclined to agree with Commissioner Hyde, that, at least under the present statute and under the present concept, probably the most they can do is to announce a policy encouraging applicants to get together on trusteeships.

It may be they could also utilize the technique of conditional grant to one of the applicants. The present rules do provide for conditional grants.

They have utilized the procedure of granting special temporary authorizations in some instances to operating UHF stations authorizing them to move to VHF. This technique could also be utilized.

As a matter of law, I think it could be extended to nonoperating UHF stations. It is a question of policy whether the Commisison wants to go that far.

Senator PASTORE. Why do you have to have a resolution on the part of the Congress? After all, they recognize the public responsibility involved.

I quite agree with you as to the problem, I can see how easy it is to criticize, but what is the solution, what is the answer? Outside of the procedures that are already available to them, I don't see that any interference on the part of Congress would help in this respect; would it?

Mr. MCKENNA. It is perhaps a situation——

Senator PASTORE. Outside of us pronouncing the fact that we are against sin. [Laughter.]

Mr. MCKENNA. A statement by the Congress could have great practical value, we feel, in encouraging applicants to get together. There has never been an official or firm policy statement made in this direction, either by the Commission or by Congress.

(A letter and memorandum on this point were received after the conclusion of the hearings and are as follows:)

AMERICAN BROADCASTING CO.,
Washington, D.C., February 22, 1960.

Hon. JOHN O. PASTORE,
Chairman, Subcommittee on Communications, Committee on Interstate and Foreign Commerce, U.S. Senate, Washington, D.C.

DEAR MR. CHAIRMAN: During my appearance before your committee on February 4, 1960, interest was expressed concerning the need and propriety of temporary authorizations to permit prompt utilization of the new VHF channels which may be assigned under the Commission's interim allocation policy.

In view of the interest expressed, I have had prepared a memorandum concerning these matters, copies of which are transmitted herewith. It is requested that this memorandum be received for the record as supplementing my statement in behalf of American Broadcasting Co.

Very truly yours,

ALFRED R. BECKMAN.

---

[1] James A. McKenna, Jr., counsel for ABC.

PUBLIC INTEREST REQUIRES AND FCC PROCEDURES PERMIT IMMEDIATE USE OF NEWLY ASSIGNED VHF CHANNELS IN SCARCITY MARKETS

The Federal Communications Commission has initiated rulemaking looking toward mileage reductions to permit the assignment of new VHF channels in the larger markets which do not have three competitive television services. This action was taken in recognition of the urgent necessity of establishing at least the minimum framework for a nationwide competitive television service, and the impossibility of accomplishing this within the forseeable future except by the assignment of additional VHF channels.

The proposed new allocations policy is designed to provide an interim solution for the period which must elapse before any basic revision of television allocations can be accomplished. The merits of this proposal have already been shown in the statement of Alfred R. Beckman, vice president of American Broadcasting Co. This memorandum is concerned with the problem of expediting implementation of the interim policy, assuming that it is put into effect.

As has been noted, the additional assignments contemplated will be to major markets which do not now have adequate competitive television service. These assignments will repreent valuable franchises which will be eagerly sought after by applicants, with the result that in virtually every instance there will be several competing, mutually exclusive applications for the new channels. In comparable situations in recent years there have been up to seven applicants competing for the same channel.

Under the Communications Act of 1934 as interpreted in the case of *Ashbacker Radio Co.* v. *Federal Communications Commission*, 326 U.S. 327, mutually exclusive applications must be designated for comparative hearing to select the one applicant whose operation of the requested facility will best serve the public interest. These comparative hearings involve the evaluation of exceedingly complex factual situations. The competing applicants are granted extensive and time-consuming procedural rights. For these reasons experience has proved that the completion of comparative television hearings requires a period of several years.

Despite unremitting efforts by the Commission, it has proved impossible to expedite the comparative hearing process. The only cases which have been disposed of in a shorter period are those in which the applicants have, through mergers or other composition of their differences, eliminated all but one of the competing applicants, permitting the Commission to shortcut the hearing process.

If the channels sought after are permitted to lie unused pending conclusion of the comparative hearing process, the effective implementation of the Commission's interim allocation policy will be seriously delayed. This delay will be in addition to the time which must be consumed before the Commission's interim policy is finally adopted and the additional VHF assignments are made. The Commission's Chairman has told the committee in his prepared statement, that "due process and the imposing array of applicable procedural requirements indicate the possibility—I would say probability—of quite considerable delay in individual cases." The delays referred to by the Chairman are in addition to those involved in comparative hearings. As delay piles on delay, the period between the time of the initial decision to make provison for a new station and the time of the station's actually taking the air, can stretch to amazing lengths. (See attached exhibit 1.) If vigorous action is not taken to eliminate all unnecessary delays the Commission's so-called interim allocations plan will not be implemented by 1965.

The following questions are therefore presented:

1. Whether the public interest requires that some extraordinary procedures be adopted to avoid delays, and

2. Whether the Commission has sufficient authority under existing legislation to institute the necessary procedures.

The first question must certainly be answered in the affirmative. In the markets with which we are concerned, the public is presently receiving the service of one or two VHF stations and in a few instances some additional service from a UHF station that is still in operation. The UHF service, if it exists, must be largely discounted. The heavy saturation of VHF-only receivers in these markets deprives UHF stations of the ability to compete effectively with the VHF stations. The service which they provide suffers as a result, both in technical quality and otherwise. Moreover, to obtain the UHF service the pub-

lic must go to substantial additional expense in purchasing UHF converters or all-channel receivers and in installing UHF receiving antennas. While such additional expense might be justified, if continuation and improvement of the UHF service could be relied upon, the fact is that, except in UHF-only markets, UHF service is on the verge of extinction. The public cannot be expected to spend money on equipment whose usefulness is presently limited and will shortly cease to exist.

The national economy is now capable of supporting three national television networks, each providing a separate program service during most of the broadcast day. The local economy of the markets with which we are here concerned, those within the first 100, approximately, is likewise capable of supporting at least three television stations providing both a full measure of national network programing as well as substantial additional programing of local origination, both recorded and live. The public in the major markets with only two stations is being deprived of one-third of the television service which is available to those communities which now have three stations.

The program service being lost is not solely entertainment, but includes informative, educational, and other public service programing of many types. The loss is greatest in these latter categories since the programs with the largest mass appeal crowd out other programs which, though probably of greater cultural value, appeal on an individual program basis to lesser segments of the audience.

A function of television is to provide an outlet for the dissemination of information by local groups and organizations of all types, including governmental agencies, political organizations, educational institutions, churches, and other civic, cultural, and charitable groups. An inadequate number of local television outlets precludes a community from realizing the potentialities of television as a medium of local expression.

The loss which the public suffers in the television scarcity markets is not limited to loss of programing choice and of full opportunity for local expression. A television station is not solely a medium of mass communications. It is also a business enterprise which contributes substantially to the economy of its community. Its operations provide employment opportunities and payrolls which contribute to the purchasing power of the community. They enhance property values and produce revenues which contribute to private and governmental income. The excellent advertising medium provided for local enterprises stimulates many other segments of the community's economy.

In short, a community without adequate local television service is poor in many ways—it is poor in choice of entertainment, it is poor in educational and cultural opportunities, it is poor in outlets for local expression, it is poor in means of publicizing and promoting local projects and enterprises, both public and private, commercial and noncommercial, and it is poor in the everyday sense of the term—in revenues both public and private.

The losses to a community which is denied the use of an assigned television channel for years, while a competitive television hearing wends its sluggish and weary course, are reasonably evident. There is also a less obvious loss to the Nation as a whole. In the scarcity markets one or more of the national networks is inevitably denied equal access, placing it at a severe competitive disadvantage. Its inability to clear time makes the entire network less desirable to national advertisers. This in turn means less programing on that network throughout the country, which means less revenue for the network with which to develop new and improved programs and less revenue for its affiliates in the markets in which it does have outlets. Thus the ultimate loser is the national public which is denied programs which would otherwise be available.

The losses suffered by the public through nonutilization of television channels will never be recouped. The opportunities for entertainment, for educational and cultural advancement, and for community development and the revenues and general economic stimulation, which were not but could have been provided, are gone forever.

The nonutilization of television channels produces no countervailing public benefit. On the contrary, as will be seen below, virtually the sole arguments in favor of letting channels lie unused during comparative hearings is that it protects the private rights of competing applicants. Television frequencies, however, belong to the public—not to the applicants—and the public interest that television channels not lie idle should be paramount.

We come now to the second question: Whether the losses resulting from permitting a valuable television frequency to lie unused can be avoided consistent with applicable law and other considerations affecting the public interest. It is not suggested that comparative hearings on competing applications should be dispensed with or that the procedural hearing rights of the competing applicants should be significantly modified or curtailed. Such a course would be contrary to existing law, would require new legislation, and would pose the difficult problem of devising a satisfactory alternative method for selecting among competing applicants. Although a comparative hearing may be required to select the ultimate regular licensee, it does not necessarily follow that the Commission may not issue some sort of temporary authority pending the conclusion and subject to the outcome of the comparative hearing. Such authorizations have been issued in a number of instances and, without exception, the Commission's authority to issue them has been upheld by the courts. There has been substantial opposition to temporary authorizations, however, and, seemingly uncertain of its authority, the Commission has failed to establish a firm or consistent policy in this area.

It is asserted that temporary authorizations pending comparative hearings are inconsistent with the rationale, if not the specific language, of the Ashbacker case, that they necessarily tend to prejudice the comparative hearing for the regular license in derogation of the rights of the competing applicants, and that, by discouraging applicants for the regular license, they deprive the Commission of a full opportunity to select the best applicant for the ultimate authorization. These appear to be the only arguments against utilization of temporary authorizations.[1]

One method of avoiding whatever force the foregoing arguments have is to grant the temporary authorization not to one of the competing applicants but to a separate organization set up by or with the consent of the competing applicants which will conduct the temporary operation, in effect as trustee for the winning applicant in the comparative hearing. This procedure is legally unassailable since it rests on the consent of the persons whose rights might allegedly be infringed by the temporary authorization. This fact, however, tends to lessen the usefulness of the procedure. In only a few cases has it proved possible to obtain the necessary consents. The formation of a trustee organization involves difficult problems respecting the provision of substantial funds for construction, the selection of the transmitter site and the determination of the other matters relating to technical details of construction of the temporary facility, the conduct of the temporary operation, and the distribution of the profits or losses. It is not surprising that competing applicants are frequently unable or unwilling to arrive at a mutually satisfactory arrangement. While the Commission might exercise some persuasion to obtain agreements, it cannot force them.

If the tustee procedure is not available because of the inability or unwillingness of the parties to reach an agreement, is the Commission powerless to fulfill the public interest by providing for temporary operation under some other arrangement? The answer is clear that it is not.

In the revised allocations plan adopted in 1952 in the sixth report and order, the Commission was faced with a number of situations in which the channel assigned to an operating television station was to be removed from the community and replaced with another channel. In these situations, delay in providing for at least a temporary operation on the new channel threatened not only the loss of the service which that channel could provide, but the elimination of an existing service on which the public had already come to rely. To avoid this, the Commission by so-called show-cause orders modified the outstanding authorizations of the existing stations to specify the newly assigned channel in lieu of the channel being removed. Such actions of the Commission were challenged in two cases, *Peoples Broadcasting Co.* v. *Federal Communications Commission* (93 U.S. App. D.C. 78, 209 F. 2d 286), and *Zenith Radio Corp.* v. *Federal Communications Commission* (93 U.S. App. D.C. 284, 211 F. 2d 629). Each of these cases involved complicated factual situations raising other

[1] Technical arguments that the Commission has no authority to issue any authorization but a "regular" license have long since been disposed of by the courts. *Crosley Corporation* v. *FCC*, 70 U.S. App. D.C. 312, 106 F. 2d 833, cert. den., 308 U.S. 605; *Columbia Broadcasting System* v. *FCC*, 93 U.S. App. D.C. 399, 211 F. 2d 644, and the 1952 amendments to the Communications Act defining a "license" to include any authorization granted under the act and the Commission's rules.

legal questions not pertinent to the subject here under consideration. For this reason and because there is a later case more directly in point it is not believed that a detailed discussion of the *Peoples* and *Zenith* cases is necessary for the purposes of this memorandum. It is sufficient to note that in each case the temporary authorization was upheld by the court. These cases clearly stand for the proposition that at least in the circumstances involved the Commission has authority to issue a temporary authorization for the utilization of a newly assigned channel pending a comparative hearing to determine the ultimate licensee of that channel on a regular basis.

To go back for a moment, in 1946, after the ruling in the *Ashbacker* case was handed down, the Commission, recognizing that situations might arise in which the public interest imperatively required prompt utilization of an available assignment, adopted a rule (now sec. 1.362(b)) providing for the issuance of conditional grants pending the conclusion of comparative hearings under certain circumstances including where it appears "that public interest requires the prompt establishment of radio service in a particular community." The Commission's action in the *Peoples* case was grounded on this rule. Despite the fact that the court upheld the Commission's action the Commission has since seemed hesitant to rely on the conditional grant rule.

In a limited number of cases involving newly assigned VHF channels the Commission has provided for an interim service by issuing "special temporary authorizations" to UHF stations already in operation in the communities to which the new channels were assigned. These cases were limited to situations in which the temporary assignment could be made to an operating UHF station, the Commission apparently being more confident of its authority to fulfill the public interest in such situations because the continued operation of the UHF station was obviously foreclosed, although not necessarily immediately, by the addition of the new VHF assignment.

Certain of these temporary authorizations were appealed by competing applicants. However, until recently the courts were denied an opportunity to pass upon the merits of the cases because upon being unsuccessful in obtaining a stay of the temporary authorizations, the appellants dismissed their appeals. See for example *Louisiana Purchase Co.* v. *Federal Communications Commission*, case Nos. 13,766 and 13,772 (order of Apr. 4, 1957) and *Veterans Broadcasting Co.* v. *Federal Communications Commission*, case No. 14,152 (order of Oct. 10, 1957). Just recently, however, such a case reached the court on the merits and the court's opinion, though it overturned the Commission's action in question because of procedural inadequacies, specifically reaffirmed the Commission's authority to grant temporary authorizations pending comparative hearings in appropriate circumstances. The court's opinion also sets forth guidelines for the exercise of that authority.

The case is *Community Broadcasting Co., Inc.* v. *Federal Communications Commission, et al.*, Case Nos. 15,313 and 15,314, decided February 8, 1960. The facts in that case follow: The Commission, after appropriate and unchallenged rulemaking proceedings had assigned an additional VHF channel, channel 9, to Baton Rouge, La. There were two operating television stations at Baton Rouge, WBRZ on VHF channel 2 and WAFB–TV, on UHF channel 28, licensed to Modern Broadcasting Co. of Baton Rouge, Inc. Both WAFB–TV and a new applicant, Community Broadcasting Co., Inc., filed competing applications for regular authorizations on the new channel 9. WAFB–TV also requested a temporary authority on channel 9 and the Commission on July 22, 1959, granted it a special temporary authorization to operate on channel 9 in Baton Rouge, subject to the following conditions:

"No effect whatsoever will be given to any expenditure of funds by Modern Broadcasting Co. of Baton Rouge, Inc., pursuant to the temporary authorization herein in any comparative hearing involving regular operation on channel 9 in Baton Rouge nor will any preference redound to Modern Broadcastig Co. by virtue of temporary operation on channel 9.

"The temporary operation on channel 9 in Baton Rouge authorized herein will expire automatically upon the commencement of operation of channel 9 in Baton Rouge by a permittee so authorized by final action of the Commission on any application or applications for regular operation on channel 9 in Baton Rouge."

Community appealed, arguing that the grant to WAFB–TV was unlawful and not within the scope of the Commission's authority, that it would prejudice Community's right to a full and fair hearing on its application for regular opera-

tion, that the Commission's action was arbitrary and capricious in that the grant was made without appropriate showing or findings as to the nature of the paramount public interest considerations, and, finally, that an application by Community for a special temporary authorization had also been timely filed and was entitled to comparative consideration with the application of WAFB–TV for temporary authority.

The majority opinion of the court, after thorough analysis of the appellant's and the Commission's contentions, upheld the Commission's basic authority commenting in pertinent part:

"The problem of temporary authorizations gained significance after the ruling in *Ashbacker Radio Corp.* v. *Federal Communications Commission*, 326 U.S. 327 (1945). The Supreme Court there held that where two mutually exclusive applications are made for the same frequency, the Commission cannot grant one application for regular operations pending the holding of a comparative hearing since the subsequent hearing would then be 'an empty thing.'

"A practical problem immediately presented itself. Comparative hearings are lengthy and detailed affairs, frequently taking years before final conclusion. Occasionally the need for continuing already operating services, or establishing new ones, was so great as to render it against the public interest to withhold authorization pending final outcome of the necessary hearings. See *American Broadcasting Co.* v. *Federal Communications Commission*, 89 U.S. App. D.C. 298, 191 F. 2d 492 (1951); *Peoples Broadcasting Co.* v. *United States*, 93 U.S. App. D.C. 78, 209 F. 2d 286 (1953). The Supreme Court implicitly recognized the dilemma for it carefully pointed out in *Ashbacker* that the Commission there did not conditionally grant the application, an inference at least that such a conditional grant pending hearing was proper in some circumstances, 326 U.S. at 331.

"Thereafter, the Commission evolved a policy of granting such temporary authority in certain circumstances. We have upheld such temporary grants, given without a comparative hearing, against contentions that such procedure violates the *Ashbacker* rule. *Peoples Broadcasting Co.* v. *United States*, *supra*. Such grants are a 'practical solution of a problem which involved the *public interest* in the continuity and quality of television service.' Id. at 80, 209 F. 2d at 288." [Emphasis supplied in part.]

And concluding:

"* * * It seems clear under the *Peoples Broadcasting* case that the Commission has power to issue a temporary authority under section 1.362(b) and under section 309(a) of the Communications Act, without a comparative hearing."[2]

The majority went on to say, however, that conditional grants must be recognized as constituting an "extraordinary procedure," that the spirit of the *Ashbacker* doctrine requires that to justify the granting of the temporary authority to last for a period of several years "the *public interest* must be clear and it must be made the subject of explicit findings in the particular case in unmistakable terms." [Emphasis supplied.] It was of the opinion that, without questioning the good faith of the Commission's intention to observe the conditions imposed on a temporary authorization, the investment involved in the temporary operation and the advantages that inhere in satisfactory interim operation for 2 to 3 years are factors having a force which cannot always be set aside by the triers no matter how sincere their efforts or intent and thus may affect in some measure the comparative determination.[3] The court further stated: "That the grant of temporary authorization to one applicant has an inevitable tendency to discourage competitors for construction permits is added reason for us to emphasize that it is a process calling for close scrutiny."

The majority was of the opinion that in the particular circumstances of the *Community* case the Commission had not made adequate findings to permit the court to review the Commission's exercise of its discretionary authority. The court summarized its holding as follows:

"We hold that the procedures for granting a special temporary authority to one of several competing applicants pending a comparative hearing must include such inquiry as is needed to make comprehensive findings on all relevant factors, including, but not limited to, the basis of the '*public need*,' and, where appropriate, the question of concentration of mass media, in situations where (a) the *public* already has some service, or (b) where the 'temporary' operation may

[2] The dissenting judge was apparently of the same view since he would have dismissed the appeal as wholly without merit.

[3] In the *Community* case the temporary authorization involved expenditures in excess of $250,000.

well last, 2 or 3 years, or (c) where the investment of the 'temporary' operator is so large as to make his failure to prevail in the comparative hearing oppressive on him." [Italic supplied.]

For failure to meet the requirements laid down by the court for the proper exercise of the discretionary authority to make a conditional grant pending a comparative hearing, the *Community* case was remanded to the Commission for further proceedings, with, as previously noted, one judge dissenting and voting to dismiss the appeal.

From the foregoing discussion the following conclusions are evident. The Commission's authority to issue conditional grants pending comparative hearings, provided findings can be made that the public interest so requires, is firmly established. Although each case must be determined upon its individual facts, in the typical case where a new VHF channel is assigned to a major market having two, or fewer, operating VHF stations, the public interest considerations favoring a conditional grant are exceedingly strong. Countervailing considerations are minimal, involving principally purely private rights and based upon speculation as to the effect upon the comparative choice offered the Commission.

The Commission's authority having again been affirmed what remains is the establishment of a firm and consistent policy for its exercise in the public interest. The following recommendations are made:

(*a*) In connection with the adoption of its interim policy permitting mileage reductions the Commission should likewise adopt an affirmative policy of seeking conditional grantees for all VHF channels newly assigned under the interim policy. As has been pointed out above, the public benefits to be derived from prompt utilization of the newly assigned channels are not limited to the individual communities involved, but have important national aspects. It is therefore appropriate that such policy be enunciated in connection with the interim allocations policy which is also being considered on a national basis. The public need which the Commission has determined warrants departures from minimum mileage separations likewise warrants establishment of a conditional grant policy. The Commission has indicated that mileage reductions will be permitted only in the scarcity markets where the public need is most pressing. It is these same markets where the public need demands immediate use of the new facility. Adoption of the new allocation policy without concurrent adoption of a conditional grant policy would be a half-measure.

(*b*) Where a UHF station is in operation and is wiling and able to conduct a temporary operation, subject to the appropriate conditions a conditional grant should be made to such UHF station. There are several considerations favoring selection of the UHF station as the conditional grantee.

(1) An operating UHF station has equipment and installations which are of use in the temporary VHF operation. It can thus conduct the temporary operation with substantially less new investment than would be required of another operator. This would tend to minimize the effect, if any, upon the comparative hearing.

(2) The public interest is served by the prompt abandonment of the UHF operation which only encourages further public investment in UHF equipment which will soon be obsolete.

(3) The UHF station is doomed to eventual extinction by the new VHF assignments and thus has an equitable claim to first consideration as a conditional grantee.

(*c*) Where no qualified UHF station is available, the Commission should formally advise all competing applicants that it will grant a temporary authorization to such qualified trustee organization as the applicants may propose and, failing a satisfactory proposal, will consider proposals for temporary operation by the individual applicants for the regular license.

(*d*) Failing a trusteeship the Commission should proceed to select among the competing applicants granting that proposal which appears least likely to affect the later comparative determination, with due regard, of course, to such other public interest considerations which the facts of the particular case may present. Where a UHF authorization is outstanding to a station which is no longer on the air or not yet on the air, consideration should be given to making the conditional grant to the holder of the UHF authorization. The considerations mentioned above favoring conditional grants to operating UHF stations are also applicable to a considerable extent in this situation.

(*e*) In some instances the provision of an additional VHF channel for a scarcity market may require moving a VHF channel from another market. In

such cases a special problem will be presented because an existing operation must be modified or terminated. In such situations, if the existing station is prepared to accept a conditional grant for temporary operation in the new market, such grant should be made. The operating VHF station will have equipment and an organized staff which will be useful in the temporary operation and can therefore undertake such operation more promptly and at less expense than other applicants. In addition, if a conditional grant is not made to the operating VHF station, the new VHF assignment could not be used until after a show cause proceeding to modify or terminate the existing VHF operation.

In each case, of course, the Commission's determination must be based upon adequate findings and reasoned conclusions as required by the court. In the majority of cases, there will be no insurmountable difficulty in arriving at a decision which is clearly in the public interest and will survive judicial review.

EXHIBIT 1

STUDY OF TIME REQUIRED FOR COMPARATIVE TELEVISION CASES

The following table I shows the length of time which has been expended in the disposition of comparative television cases which have been prosecuted to the end and not shortened by merger or other arrangement between parties.

Table II shows the delays thus far encountered in connection with newly assigned VHF channels where comparative hearings have been required and no temporary authorizations have been issued.

TABLE I

Application	Date channel allocated	Date designated for hearing	Date of final decision [1]	Elapsed time (months)[2]
Beaumont, Tex	Apr. 14, 1952	July 11, 1952	Aug. 6, 1954	28
Boston, Mass	do	June 16, 1954	Apr. 25, 1957	60
Bristol, Va.-Tenn	do	Jan. 27, 1954	Apr. 13, 1956	48
Canton, Ohio	do	July 11, 1952	Mar. 22, 1956	47
Charlotte, N.C	do	Jan. 13, 1954	Dec. 13, 1956	56
Cheboygan, Mich	do	Sept. 18, 1955	July 28, 1958	75
Denver, Colo. (7)	do	July 11, 1952	June 30, 1953	15
Flint, Mich	do	do	May 14, 1954	25
Fort Wayne, Ind	do	do	Oct. 1, 1954	30
Fresno, Calif	do	Aug. 20, 1953	Jan. 12, 1956	45
Hartford, Conn	do	Sept. 30, 1953	July 25, 1956	39
Indianapolis, Ind	do	Mar. 10, 1954	Mar. 8, 1957	59
Jacksonville, Fla	do	Jan. 6, 1954	Aug. 31, 1956	52
Knoxville, Tenn	do	May 13, 1953	Jan. 13, 1956	45
Madison, Wis	do	Aug. 14, 1953	Dec. 12, 1955	44
Memphis, Tenn	do	Nov. 18, 1953	May 27, 1955	37
Miami, Fla. (7)	do	Jan. 20, 1954	Jan. 20, 1956	45
Miami, Fla. (10)	do	Dec. 30, 1953	Feb. 8, 1957	57
Mobile, Ala	do	Apr. 15, 1953	Mar. 24, 1955	35
New Orleans, La	do	Dec. 2, 1953	July 13, 1956	51
Norfolk, Va	do	Dec. 9, 1953	May 31, 1956	49
Oakland, Calif	do	Oct. 14, 1953	July 1, 1957	63
Odessa, Tex	do	Mar. 31, 1954	July 15, 1955	39
Omaha, Nebr	do	Feb. 17, 1954	Apr. 27, 1956	48
Orlando, Fla	do	June 23, 1954	June 7, 1957	61
Paducah, Ky	do	Jan. 27, 1954	Nov. 15, 1956	67
Peoria, Ill	do	June 10, 1953	June 29, 1956	50
Petersburg, Va	do	Oct. 28, 1953	Oct. 1, 1954	30
Portland, Oreg. (12)	do	July 11, 1952	July 27, 1954	27
Portland, Oreg. (8)	do	do	June 29, 1955	39
Portland, Oreg. (21)	do	do	Sept. 25, 1953	17
Raleigh, N.C	do	Jan. 20, 1954	June 29, 1956	50
Sacramento, Calif. (10)	do	July 11, 1952	Oct. 4, 1954	30
Sacramento, Calif. (3)	do	Oct. 29, 1952	Apr. 15, 1955	36
St. Louis, Mo	do	Dec. 2, 1953	Mar. 29, 1957	60
St. Petersburg, Fla. (13)	do	July 18, 1952	Sept. 2, 1954	29
St. Petersburg, Fla. (8)	do	July 11, 1952	Aug. 6, 1954	28
Savannah, Ga	do	May 13, 1953	Feb. 3, 1955	34
Shreveport, La. (3)	do	Apr. 22, 1953	Feb. 18, 1955	34
Shreveport, La. (12)	do	May 20, 1953	May 20, 1955	37
Springfield, Ill	do	Sept. 30, 1953	June 29, 1956	38
Toledo, Ohio	do	June 25, 1954	July 28, 1958	53

[1] This is the date of the decision by the Commission following oral argument.

[2] The time consumed in consideration of petitions for rehearing or in further hearings where a remand has been ordered by a court has not been included in the computation of elapsed time.

TABLE II

Application	Date of proposal to assign channel	Date designated for hearing	Date of final decision	Delay to date (months)
Tampa-St. Petersburg (10)	Apr. 14, 1955	May 23, 1958	Still awaiting.	58
Miami (6)	June 26, 1956	Nov. 12, 1958	do	44
Davenport-Rock Island-Moline (8)	do	June 26, 1958	do	44
Beaumont-Port Arthur (12)	Jan. 18, 1957	Aug. 1, 1957	Nov. 6, 1959	[1] 34
Lake Charles-Lafayette (3)	do	Sept. 25, 1957	Still awaiting.	37
Terre Haute (2)	Nov. 6, 1956	Dec. 5, 1957	do	39

[1] Delay shown is to date of final decision. A petition for reconsideration is pending and station is not yet on the air.

Mr. BECKMAN. In the final analysis it is benefit to the public that must control. The public benefits by receiving more service. We as a network benefit by the added revenue we obtain when we add an affiliate in markets now underserved.

We are expected to produce public service programing comparable to that of the other networks. Just 2 weeks ago we agreed, under the auspices of Chairman Doerfer's public service programing plan, to broadcast public service programing in prime evening time. Funds now lost to us through lack of outlets in major markets will, when obtained, enhance our ability to serve the public in this most important field.

I can summarize our position this way:

The adoption of any long-range solution involving substantial changes in the present system will take a great deal of time.

Major improvement on an interim basis can be accomplished now by allocating additional channels to critically underserved communities on the basis proposed by the Commission. The number may be small. The improvement will be great. Present service will be protected. Millions of families will gain service.

This improvement can be achieved without in any real way limiting the Commission's opportunity to adopt whatever ultimate position it chooses. Anything the Commission would want to do later on could be done just as effectively with a few more or a few less VHF stations in operation. If, for example, it can shift 518 existing VHF stations to UHF channels it would not really be more difficult to shift 550 such stations. Any increased difficulty would be more than offset by the interim improvement in television service furnished by the additional stations.

On this basis we feel that the public interest compellingly requires action now even though the action taken does not purport to represent an overall permanent solution. The public of the United States has everything to gain by such action.

Senator PASTORE. As I understand the essence of your presentation today, it is that you would commend the Commission for its policy in reducing separations so as to drop in additional VHF stations in the meantime?

Mr. BECKMAN. That is correct.

Senator PASTORE. And you would hope their procedures would be such that while this litigation is going on they would expedite the

granting of the license so that the public would not be deprived of the advantage of the new facility in the meantime?

Mr. BECKMAN. That is correct.

Senator PASTORE. And, if possible, that priority be given to an operating UHF station that is meeting economic difficulties because it has been holding off—or in some instances a nonoperating UHF station—but if possible a conditional grant if trusteeship cannot be accomplished; is that correct?

Mr. BECKMAN. That is correct.

Senator PASTORE. We have more or less said that in our report, haven't we? We have said that time and time again, and I think the Commission knows pretty much how we feel about it. I would be willing to say it again, I suppose it might have some effect; but what you have said here today we have felt for a long, long time.

Mr. BECKMAN. We have, too, Senator.

Senator PASTORE. Thank you very much.

(Exhibits 1 and 2 to the statement of Mr. Beckman are as follows:)

EXHIBIT 1

Three networks specials and public service programs, December 1–31, 1959

Market	Number telecasts available	Number telecasts carried	Percent telecasts carried
Birmingham	83	37	45
Charlotte	83	32	39
Grand Rapids-Kalamazoo	83	27	33
Jacksonville	83	41	49
Louisville	83	43	52
Providence	83	34	41
Raleigh-Durham	83	35	42
Rochester	83	26	31
Syracuse	83	28	34
Wheeling-Steubenville	83	27	33
Total	830	330	40

Source: TV Guide.

EXHIBIT 2

Problem market box score

Market	Total number of ABC programs	Live		Delay		Pending, unavailable	
		Number	Percent	Number	Percent	Number	Percent
Birmingham	52	2	4	18	35	32	61
Charlotte	52	10	19	16	31	26	50
Grand Rapids-Kalamazoo	52	1	2	21	40	30	58
Jacksonville	52	10	19	10	19	32	62
Louisville	52	1	2	17	33	34	65
Providence	52	2	4	12	23	38	73
Raleigh-Durham	52	6	11	17	33	29	56
Rochester	52	3	6	20	38	29	56
Syracuse	52	3	6	19	37	30	57
Wheeling-Steubenville	52	4	8	11	21	37	71
Total	520	42	8	161	31	317	61

Senator PASTORE. I have received a letter from Congressman Ayres, who testified before this subcommittee on Tuesday, making a correction to that testimony. His letter will be made a part of the record at this point.

(The letter referred to reads as follows:)

HOUSE OF REPRESENTATIVES,
Washington, D.C., February 3, 1960.

Hon. JOHN O. PASTORE,
Chairman, Subcommittee on Communications,
Committee on Interstate and Foreign Commerce,
U.S. Senate, Washington, D.C.

DEAR SENATOR PASTORE: In my testimony yesterday before the Subcommittee on Communications regarding television allocation matters, I made an inadvertent error which I would like to correct. In answer to a question by Senator Monroney whether UHF television station WAKR–TV had a network affiliation I answered in the negative. I am advised that WAKR–TV has been affiliated with the ABC television network since it went on the air and carries a substantial number of programs from the network. It telecasts about all of the daytime ABC television network programs and some of the nighttime ABC commercial programs. However, the class A network hourly rate for WAKR–TV is only $150 as contrasted with the class A network hourly rate for ABC's Cleveland outlet (WEWS) of $2,400. As a matter of fact, the WAKR–TV network rate is only one-half of its local hourly rate ($300) whereas, on the other hand, the network rate of the Cleveland ABC television outlet is 50 percent higher than its local hourly rate ($1,560).

Akron is an entirely separate community from Cleveland and, as I said, I consider it vital that it have its own VHF television station. Akron has its own four AM broadcast stations which are listened to by the Akron residents, and the Cleveland AM stations, including the high power 50 kilowatt stations, have substantially no audience in Akron. The same is true in the newspaper field, since the Cleveland papers have very little circulation in Akron. Moreover, three of the four Akron stations are affiliated with AM national networks, even though the same networks have affiliations with Cleveland stations.

Sincerely yours,

WILLIAM H. AYRES,
Member of Congress.

Senator PASTORE. The subcommittee will now recess until 10 o'clock tomorrow morning.

(Whereupon, at 3:55 p.m., the committee recessed to reconvene at 10 a.m., Friday, February 5, 1960, in room 5110, New Senate Office Building.)

TELEVISION INQUIRY—ALLOCATIONS PHASE

FRIDAY, FEBRUARY 5, 1960

U. S. SENATE,
COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE,
SUBCOMMITTEE ON COMMUNICATIONS,
Washington, D.C.

The subcommittee was called to order at 10 a.m., in room 5110, New Senate Office Building, Hon. John O. Pastore, presiding.

Senator PASTORE. All right, this hearing will please come to order.

I offer for the record at this time the various actions taken by the Federal Communications Commission recently with reference to allocations; also, various correspondence and documents concerning the recommendations of K. A. Norton, Chief, Radio Propagation Engineering Division, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colo.; and a classification of the top 100 markets as now used by the FCC.

(The documents referred to are as follows:)

(a) RECENT ACTIONS BY THE FEDERAL COMMUNICATIONS COMMISSION WITH RESPECT TO ALLOCATIONS

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON 25, D.C.
Docket No. 13340

In the Matter of Interim Policy on VHF Television Channel Assignments and Amendment of Part 3 of the Rules Concerning Television Engineering Standards

NOTICE OF PROPOSED RULEMAKING

1. The Commission herein invites comments on its proposal to—

(a) Consider applications for waivers of minimum television station separations in exceptional, individual cases meeting the criteria set out below; and

(b) Adopt revised rules and standards governing calculations of the service areas of television broadcast stations.

Interim policy on VHF channel assignments

2. In a statement submitted to the Senate Committee on Interstate and Foreign Commerce on April 17, 1959, by the Chairman of the Commission, it was announced that the Commission is pursuing studies and negotiations needed to ascertain the practicability of four alternative approaches to basic revision of television allocations. Each of these four alternatives contemplates long-range reallocations which would require a period of years to carry out if it were found desirable and practicable to adopt it.

3. Recognizing the urgency of taking such action in the interim as would relieve the pressing scarcities of channel assignments needed to provide at least three competitive television services in the major markets, the Commission announced also that, in view of the practical limitations on the utilization of UHF channels for this purpose, it would endeavor to make such increased use of VHF frequencies as could be justified in the light of the circumstances existing in particular markets. Because of the large number of persons affected,

the Commission indicated that this need is pressing in the larger markets which have so far been unable to obtain three competitive television services.

4. Recognition was also given to the near exhaustion of possibilities for making VHF assignments in such markets which would meet the minimum separation requirements which were established in the Rules in 1952, and have been adhered to since that time, with negligible exceptions. The Commission continues to regard the standard minimum separations as a necessary and important factor governing the utilization of television channels generally under the existing nationwide allocations scheme. Owing, however, to the urgency of relieving serious shortages, the Commission announced that it will consider, in appropriate cases, limited and specific exceptions to the existing minimum cochannel separation requirements.

5. We propose at this stage to consider short-spaced cochannel assignments only in circumstances in which such action is clearly warranted by the urgency of the need for providing additional VHF television outlets during the interim until final decisions can be reached on basic revision of the present television allocation plan. We have concluded, after carefully considering all the courses of action available during the present "interim" period that at this stage our consideration of short spaced VHF television assignments can be considered usefully only in cases where the following conditions are present:

(a) The assignment would make possible a second or a third VHF television stations in an important television market.

(b) The need for the additional service outweighs the need for any service lost as a result of additional interference to existing stations.

(c) The new VHF service would not have substantial adverse effect on established UHF television services.

(d) A new assignment would not require an excessive number of channel changes of existing stations.

6. It is proposed to require any new station assigned at a substandard cochannel separation to suppress radiation in the direction of the existing station to the extent necessary to ensure that such new station creates no more interference to the existing station than would be caused if both stations were operating at the standard minimum spacing permitted under Section 3.610 of the Rules, and with maximum antenna height and power. The method for calculating the required suppression of the new station's radiation is set out in paragraphs 17 and 18, hereinbelow.

7. New cochannel stations at substandard spacings will be required to comply with all requirements of the rules and standards applicable to television broadcast stations except the minimum cochannel spacings set out in Section 3.610 of the Rules. This means, for example, that new stations will be required to meet minimum adjacent channel spacings, which it is now proposed to reduce to 40 miles for all television broadcast stations. They will also be required to provide a signal of the prescribed minimum field intensity over the principal city provided for in the proposed rules revisions appended hereto.

8. Since short-spaced assignments will be considered only in the exceptional circumstances conforming with the criteria set out in paragraph 6 hereof, we do not propose to reduce the cochannel separations which are now provided for in Section 3.610 of the Rules, and which will remain generally applicable. Our proposal herein contemplates that consideration be given to short-spaced channel assignments in individual cases either on the Commission's own motion or pursuant to petitions for amendment of the Table of Assignments in Section 3.606 of the Rules which are accompanied by requests for waiver of the standard minimum spacing requirements.

Revision of television engineering standards

9. On March 16, 1959, the Television Allocations Study Organization (TASO) submitted a report to the Commission covering two and a half years of study of various factors related to the assignment of television broadcast channels on an engineered basis. The data obtained through this study makes it possible to refine some of the VHF technical data contained in our present rules. We are not prepared at this time to propose similar refinements of UHF standards in the rules.

10. The present rules of the Commission define two Grades of service and specify a certain minimum value of signal strength which must be placed over the principal city in the area served. This grading is somewhat misleading, since it is concerned merely with the probability of a specified percentage of the loca-

tions which are likely to receive a certain signal strength and is not directly concerned with the quality of such reception.

11. A more meaningful definition of television service is desirable and the TASO studies provide the basis for such a definition. On this basis we deem it appropriate to consider the service area of a television station as including the area over which it provides a signal of sufficient strength to produce an acceptable picture to average home television receiving installations in at least 50 percent of the locations within the area for 90 percent of the time or better. Comprehensive subjective viewing tests conducted by TASO showed that a picture relatively free of manmade electrical noise but with a discernible interference pattern from another television station, was considered acceptable by the average television viewer. We recognize that a more critical viewer might demand a picture free from noise and interference. However, such a strict definition of service would indicate a severely restricted service area and would not be realistic. Actual field strength measurements made in the vicinity of a large number of typical homes were compared with the viewers rating of picture quality in those homes.

12. It was found that on VHF channels the following median signal strengths would produce an acceptable picture as defined above in paragraph 11:[1]

Channels 2–6	Channels 7–13
40 dbu	50 dbu

The area encompassed by the above field strength contours taken from the F(50,90) Field Strength Charts in Section 3.699 is proposed to be defined as the Normal Service Area of a television broadcast station. The F(50,90) charts give the distances at which the above median field strengths are likely to occur in at least 50 percent of the locations for 90 percent of the time or better. The above values of field strength establish the extent of the Normal Service Area of a television broadcast station in the absence of interference from other TV broadcast stations or manmade electrical noise.

13. A study of the performance capabilities of modern television receivers shows that a new and well designed receiving installation is capable of providing an acceptable picture with less than the above values of field strength. However, such performance deteriorates with aging of the receiver and antenna installation and the values chosen are representative of the required field strengths at typical home installations.

14. Our present rules contain a requirement regarding the minimum signal which must be placed over the principal city in the area to be served. Experience has shown that the present rule is inadequate in that stations which have been located at extreme distances away from the principal city do not provide the quality of service which should be available to the principal city. We now purpose to redefine this requirement in a way that will insure that a picture of excellent quality will be provided to at least 90 percent of the locations within the principal city for 90 percent of the time or better. This service will be called Principal City Service. Studies incorporating the use of TASO data showed that on VHF channels the following median field strengths would provide a television picture free of manmade electrical noise to reasonably good receiving installations in highly urbanized areas:[2]

Channels 2–6	Channels 7–13
80 dbu F(50, 90)	85 dbu F(50, 90)

The proposed rules would require that a television broadcast station be so located that it could provide the above median field strengths for 90 percent of the time or better over the entire principal city in the area to be served.

15. Since the Ad Hoc Committee submitted its report[3] a substantial number of additional field strength measurements have become available. These new data indicate that the original Ad Hoc curves for the service fields are still valid, but that the tropospheric propagation curves for the greater distances should be modified. After studying the fit of the data to the various propogation

[1] See app. B for a statement of the factors used to confirm the values.
[2] See app. C for a statement of the factors used in determining these values.

curves available, it was decided to derive a new set of field strength curves by merging the original Ad Hoc curves for the shorter distances with the tropospheric curves of FCC Report 2.4.16 (Oct. 22, 1956). Justification for the use of these curves rather than the curves proposed by TASO as the best average propagation curves for television will be made in a forthcoming report. The revised curves, which are set out in attachments to Appendix A, hereof, are designed "F(50, 90)", "F(50, 50)" and "F(50, 10)". These curves represent the median location field strengths exceeded for 90, 50, and 10 percent of the time. The F(50, 90) curves are used to calculate the normal service and principal city service ranges in the absence of interference. The signal here specified for principal city service includes a factor for urban noise.

16. The F(50, 50) and F(50, 10) curves together with the required signal to interference ratio are used to determine television service in the presence of interference. The curves are drawn for a receiving antenna height of 30 feet and for transmitting antenna heights of from 100 to 5000 feet. Since the proposed curves are based on average terrain conditions, it may be expected that there will be some disparity, depending upon local terrain, between actual service and interference conditions and those calculated in accordance with the revised curves and methods proposed herein.[4]

17. As stated in paragraph 6, above, it is proposed that any new TV stations exceptionally assigned at substandard co-channel separations be required to suppress radiation so as to avoid creating more interference to existing TV stations than they would receive from new stations operating with maximum facilities at the minimum separations provided for in Section 3.610 of the Rules. The new station will insure the required degree of equivalent protection by either reduction in power and antenna height or by directionalization of signals. The ratio of the maximum to minimum radiation in the horizontal plane shall not exceed 20 db. At this time precision offset may be used to improve service but not for the purpose of obtaining the required protection to existing stations. In computing the equivalent protection of the normal service area of a station authorized previous to the adoption of this interim program it will be assumed that the authorized station has a circular service area. For the new station at substandard spacing, the theoretical antenna radiation pattern will be used for computing service and interference. Comments are invited on the desirability and methods for establishing the operating radiation pattern of the new station and for protection of the service area of the new station.

18. Protection equivalent to that insured existing stations under the rules governing minimum separations and maximum antenna heights and powers will be afforded by requiring stations operating at substandard co-channel spacings to suppress radiation toward the existing station to the extent necessary to insure that the ratio of desired to undesired signal will not be less than 28 db (offset operation) at any point where such ratio would occur if the new and the existing station were operating with maximum facilities at the minimum spacing permitted in Section 3.610 of the Rules. In general, protection of the normal service range of an existing station on a line between the stations will provide protection in other directions as well but the new station must make this showing based on the particular facilities proposed. The value of 28 db was established on the basis of subjective viewing tests conducted prior to the adoption of the present TV allocation plan in 1952. (See paragraphs 97 and 98 of the Sixth Report and Order in Dockets 8736, *et al*). Similar subjective viewing tests conducted by TASO yielded almost identical results.[5]

---

[3] See "Report of the Ad Hoc Committee on TV Broadcasting," May 31, 1949, vol. I, docket Nos. 8736, et al.

[4] In the computation of interference, between two time-fading signals, a good approximation is available when the time fading of one is at least twice large as that of the other. See reference F of the Ad Hoc Committee Report. Under such conditions the signal with the lesser fading may be assumed as constant at its median value. Thus, for co-channel interference the time fading of the desired signal is usually small enough to meet this criterion in relation to the fading of the interfering signal. In this case the desired signal may be assumed as constant at its time median value, so that 90% service exists when the 10% level of the interfering signal is equal to the permissible instantaneous interference level for the grade of service involved. Similarly, in the case of interference from noise that the time fading of noise is assumed to be negligible, so that 90% service exists when the 90% desired signal is equal to the minimum required instantaneous signal level required for the grade of service involved.

[5] The TASO evaluation yielded a figure of 26 db.

19. TASO found that conventional TV receiving antennas have directive properties which provide as much as 6 db discrimination between desired and undesired signals. While this factor was not used in determining equivalent protection, it will provide additional protection for existing stations in some directions. In computing the protected service of existing stations the desired signal strength of the existing station is obtained from the F(50, 50) curves and the strength of the interfering signal is obtained from the F(50, 10) curves.

20. In determining service gains and losses resulting from the assignment of a new station at substandard co-channel spacings, the effect on service rendered by adjacent channel stations will be calculated on the basis of the TASO studies which show that service is rendered out to the point where the desired to undesired ratio is minus 24 db or less.

21. All interested persons are invited to file, on or before February 19, 1960, comments supporting or opposing the proposals set out in this Notice and in the Appendices hereto, or submitting any modification or counterproposals the parties may wish to submit. Comments in reply thereto may be submitted by March 7, 1960. The Commission will consider all comments filed hereunder prior to taking final action in this matter provided that, notwithstanding the provisions of Section 1.213 of the Rules, the Commission will not be limited solely to the comments filed in this proceeding.

22. The requisite statutory authority is contained in Sections 4 (i) and 303 of the Communications Act of 1934, as amended.

23. In accordance with the provisions of Section 1.54 of the Commission's Rules and Regulations, an original and 14 copies of all statements, briefs, or comments shall be furnished the Commission.

FEDERAL COMMUNICATIONS COMMISSION,[6]
MARY JANE MORRIS, *Secretary.*

Attachments:
Adopted: January 4, 1960.
Released: January 7, 1960.

DISSENTING STATEMENT OF COMMISSIONERS BARTLEY AND LEE

The interim action proposed is to remedy the critical shortages of facilities in a number of important population centers (major TV markets) with only one or two commercial VHF stations.

Addition of VHF assignments at reduced mileage separation will, in my judgment, substantially prejudice any long-range program other than an all-VHF system.

This step is being taken at a time when the majority believes that within the next few weeks we will know whether or not an expanded VHF system is feasible eventually.

If an expanded VHF system is feasible eventually, the first areas which should be provided for are those areas without VHF service, then those with a single VHF service, and so on.

If an expanded VHF system is not feasible eventually, the interim plan should mesh with the long-range plan and it may well be that a more vigorous program of deintermixture toward UHF markets is the only such solution.

---

[6] See attached dissenting statement of Commissioners Bartley and Lee.

APPENDIX A

PROPOSED AMENDMENTS TO PART 3 OF THE RULES

1. Amend Section 3.610(c) (1) to read as follows:

"(c) Minimum assignment and station adjacent channel separations applicable to all zones:

"(1) Channels 2–13: 40 miles.

"Channels 14–83: 55 miles."

2. Amend Section 3.683 as follows:

Change the title of this section to read as follows:

§ 3.683 Field strength contours.

Change the term "Grade A" and "Grade B" to "Principal City Service" and "Normal Service", respectively, wherever they appear in this section.

Substitute the following for the present tabulation in paragraph (a):

	Principal city service (dbu)	Normal service (dbu)
Channels 2 to 6	80	40
Channels 7 to 13	85	50
Channels 14 to 83 [1]	80	64

[1] For the present F(50, 50) chart may be used.

In the last sentence of paragraph (a) change the term "F(50,50)" to "F(50,90)".

3. Amend Section 3.684 as follows:

(1) Substitute the following for present paragraph (a):

"(a) All predictions of coverage made pursuant to this paragraph shall be made without regard to interference and shall be made only on the basis of estimated field strengths obtained from the charts in § 3.699. The peak power of the visual signal is used in making predictions of coverage."

(2) In paragraph (c) substitute the following for the first two sentences in the present text:

"In predicting the distance to the field strength contours, the F(50,90) field strength charts in § 3.699 shall be used. If the 90-percent field strength is defined as that value exceeded for 90 percent of the time, these F(50,90) charts give the estimated 90-percent field strengths exceeded at 50 percent of the locations in decibels above 1 microvolt per meter." [1]

(3) In paragraph (c) substitute the terms "Principal City Service" and "Normal Service" for the terms "Grade A" and "Grade B" respectively, wherever they appear.

(4) In the first sentence of paragraph (e) delete the expression "Grade A and Grade B field intensity contours" and substitute therefor the expression "normal service contour".

4. Amend Section 3,685 as follows:

(1) Substitute the following text for the present text of paragraph (a):

"(a) The transmitter location shall be chosen so that, on the basis of the effective radiated power and antenna height above average terrain employed, the Principal City Service contour will encompass the entire principal community to be served."

(2) Delete the first sentence in paragraph (c).

(3) Substitute the following sentence for the second sentence in paragraph (c):

"In considering applications proposing the use of questionable antenna locations the Commission may require site tests to be made."

5. Amend Section 3.686 as follows:

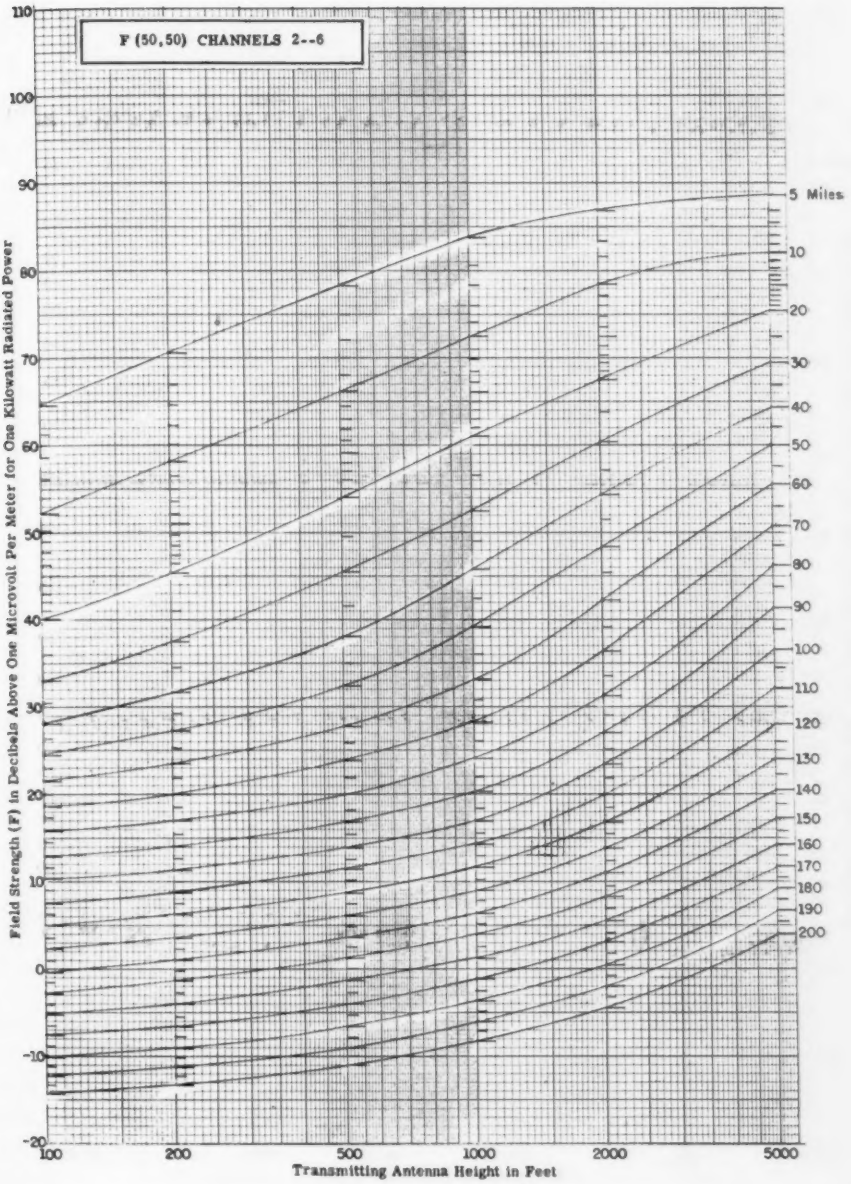
(1) Delete the first sentence in paragraph (a).

(2) In paragraph (g)(1) substitute the term "Principal City and Normal Service Contours" from "Grade A and Grade B field intensity contours".

6. New Propagation Curves are attached.

---

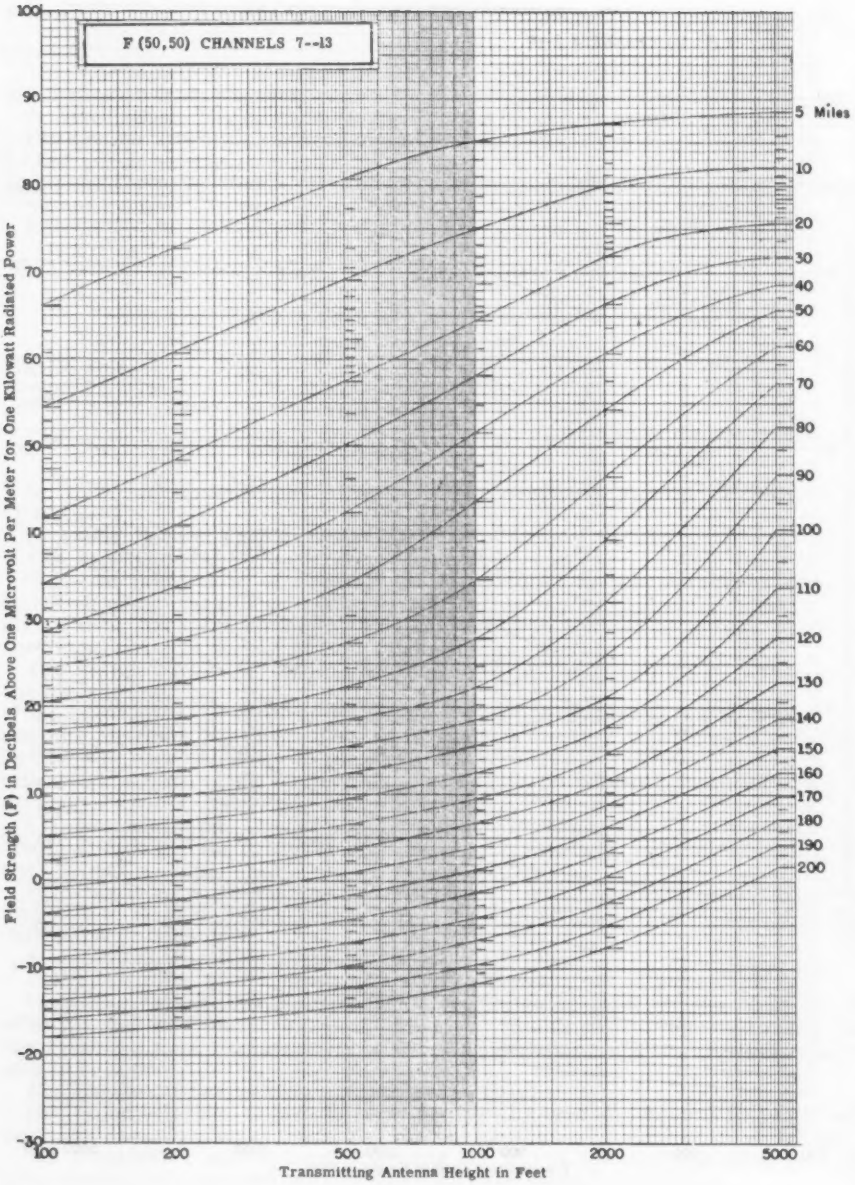
[1] For Channels 14 to 83 use is made of F(50,50) chart.



TELEVISION CHANNELS 2-6
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL RECEIVER LOCATIONS FOR AT LEAST 50 PERCENT OF THE TIME AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

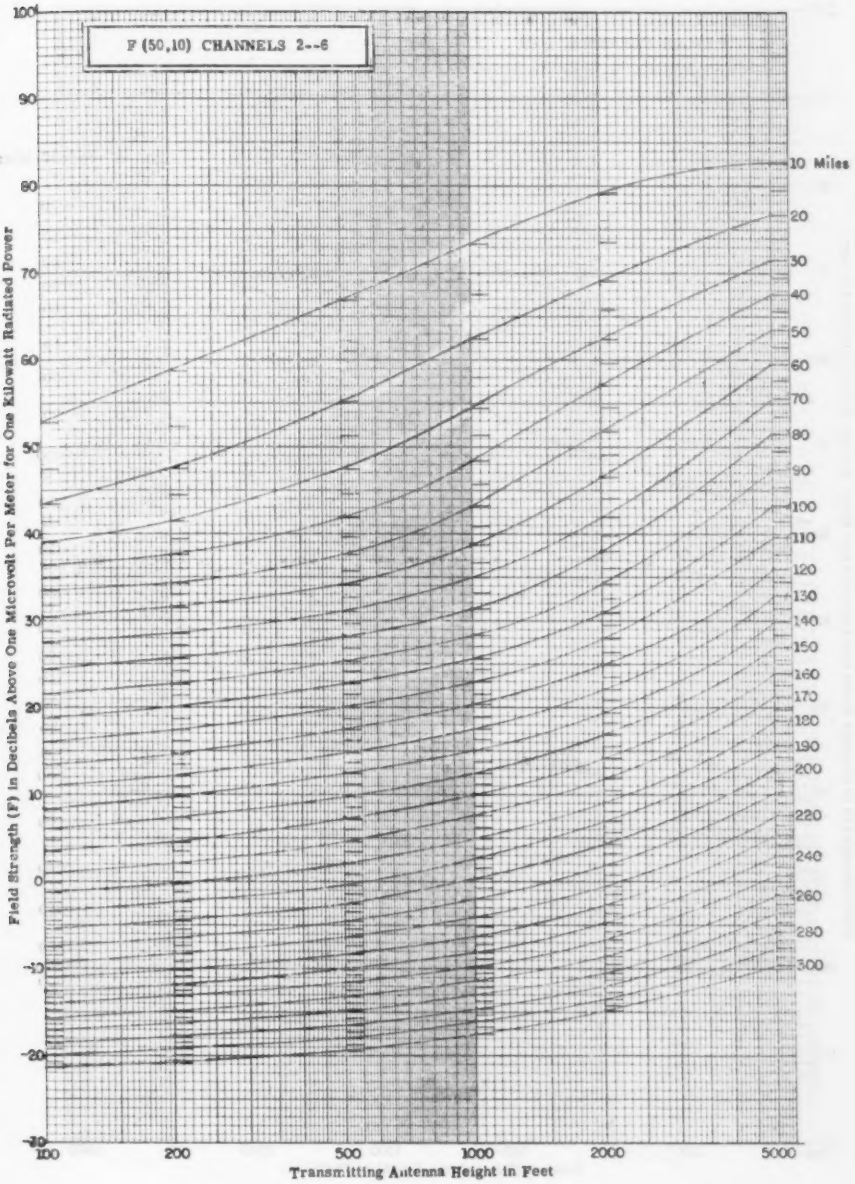
January 5, 1960

53043—60—pt. 8——16



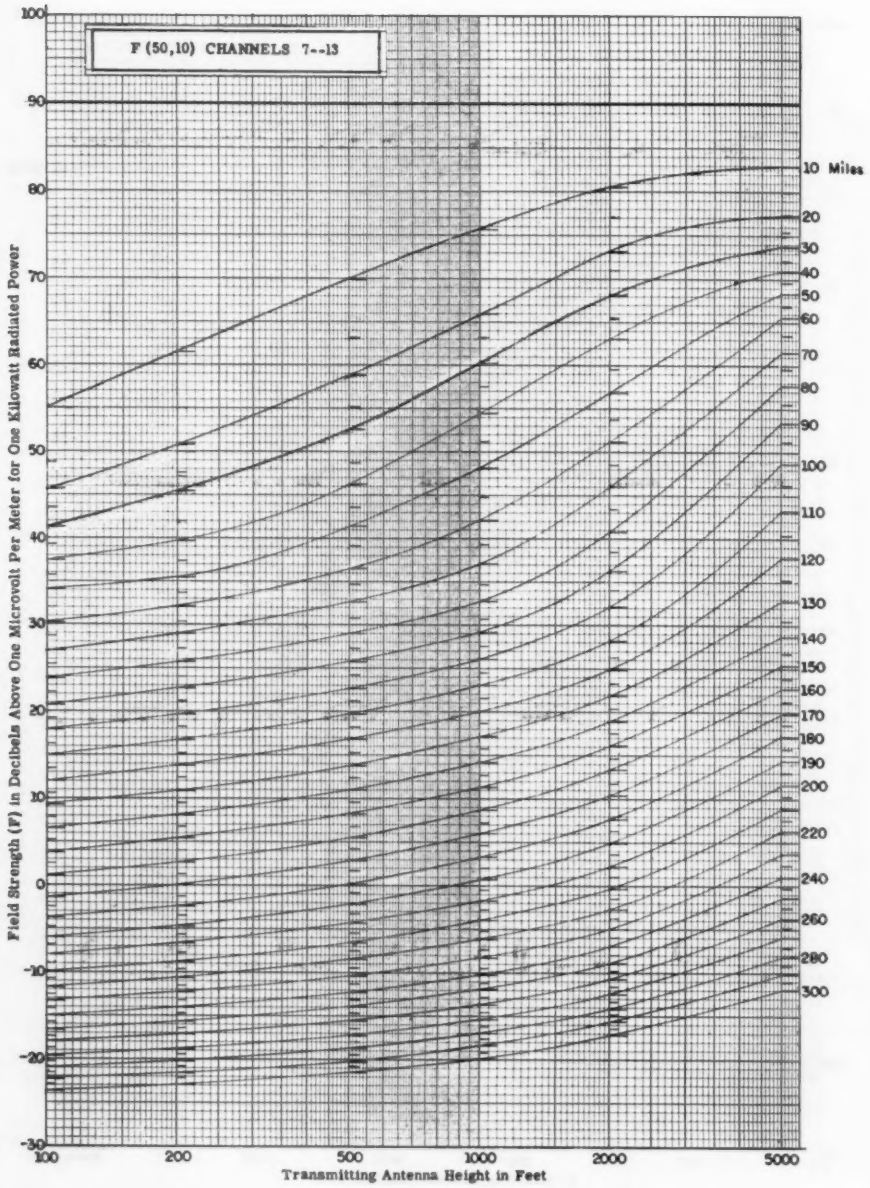
TELEVISION CHANNELS 7-13
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL
RECEIVER LOCATIONS FOR AT LEAST 50 PERCENT OF THE TIME
AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

January 5, 1960



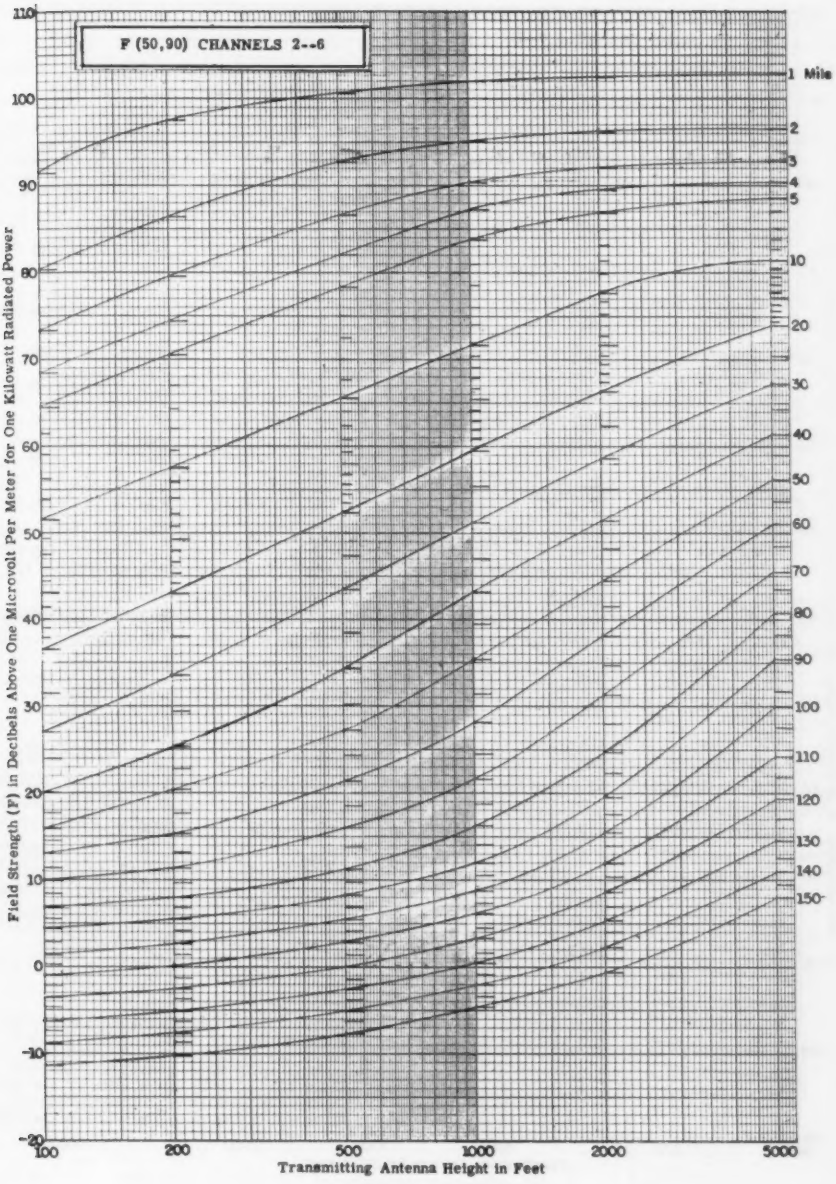
TELEVISION CHANNELS 2-6
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL
RECEIVER LOCATIONS FOR AT LEAST 10 PERCENT OF THE TIME
AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

January 5, 1960



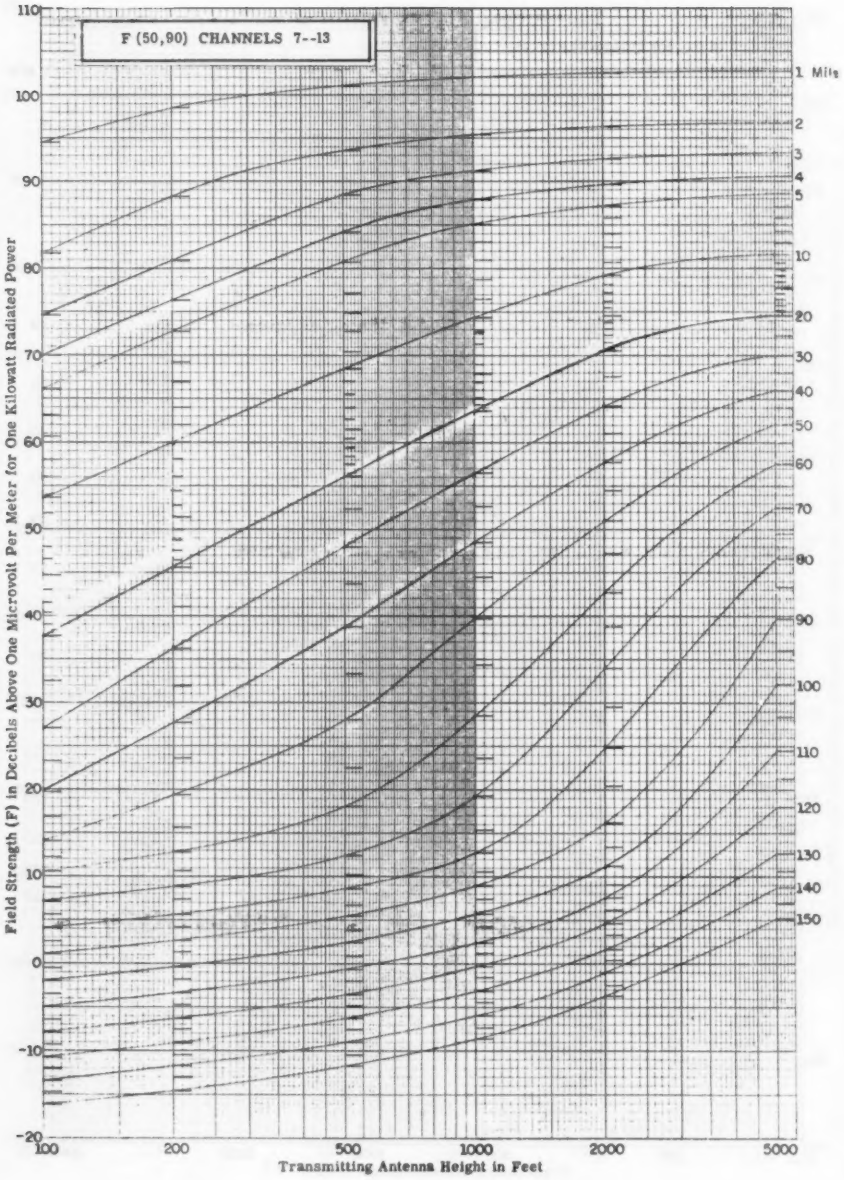
TELEVISION CHANNELS 7-13
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL RECEIVER LOCATIONS FOR AT LEAST 10 PERCENT OF THE TIME AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

January 5, 1960



TELEVISION CHANNELS 2-6
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL RECEIVER LOCATIONS FOR AT LEAST 90 PERCENT OF THE TIME AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

January 5, 1960



TELEVISION CHANNELS 7-13
ESTIMATED FIELD STRENGTH EXCEEDED AT 50 PERCENT OF THE POTENTIAL
RECEIVER LOCATIONS FOR AT LEAST 90 PERCENT OF THE TIME
AT A RECEIVING ANTENNA HEIGHT OF 30 FEET

January 5, 1960 F.C.C. - Washington, D. C.

APPENDIX B

The following factors were used to determine the signal strength required to provide an acceptable picture at 50 percent of the locations for 90 percent of the time; defined as Normal Service—

	Channels 2-6 [1]	Channels 7-13 [1]
1. Picture quality	Passable	Passable
2. Thermal boise (dbu at 300 ohms)	7	7
3. Receiver noise figure (db)	7	8
4. Required visual peak to R.M.S. noise ratio (db)	30	30
5. Receiving antenna transmission line loss (db)	2	3
6. Receiving antenna loss (db)	−3	−6
7. Dipole factor (db)	−3	8
8. Required local field (F(50, 90)) (dbu)	40	50

[1] The mean frequency used in computing the values used for channels 2-6 is 71 mc. and for channels 7-13, 195 mc.

EXPLANATORY NOTES

1. Taken from TASO data on subjective viewing tests.
2. This is the theoretical thermal noise which would be generated by a 300 ohm resistance at 300 degrees Kelvin over a 4 megacycle bandwidth.
3. These noise figures are typical of an average television receiver found in use today.
4. The values listed were derived from analysis of the subjective data contained in the TASO Report.
5. The values listed correspond to the average for 5-year-old transmission line when wet as reported by TASO.
6. These values are typical of those found by TASO.
7. These values take into account the average physical size of a halfwave dipole at the frequencies under consideration with respect to the signal strength in microvolts per meter and is determined by the formula $-20 \log. 96.5/f_{Mc.}$

APPENDIX C

The following factors were used to determine the strength of the signal which must be placed over the entire principal city, to provide an excellent picture at 90 percent of the locations for 90 percent of the time in the presence of manmade electrical noise at levels found in highly urbanized areas, if a reasonably good receiving antenna installation is employed. The value is sufficiently high to permit reception of an acceptable picture at many locations with an indoor antenna or on a lower quality receiver.

	Channels 2-6	Channels 7-13
1. Quasi-peak noise field relative to halfwave dipole (dbu)	49	46
2. Ratio of signal to quasi peak noise required to produce an excellent picture (db)	24	24
3. Location probability factor (db)	7	10
4. Urban depression loss (db)	3	9
5. Operating receiving antenna loss referred to a halfwave dipole (db)	−3	−4
Median field strength required for principal city service (F(50,90)) (dbu)	80	85

EXPLANATORY NOTES

1. Obtained from the Chart on page 763 of the handbook entitled "Reference Data for Radio Engineers", 4th Edition, published by International Telephone and Telegraph Corporation, corrected for a bandwidth of 4 megacycles.
2. It is assumed that a 24 db signal-to-noise ratio is necessary to render the noise interference inconspicuous in pictures representing average program material. This corresponds to a quasi-peak noise level of 6.25 percent of the peak video level.

3. From T.R.R. 2.4.16, October 22, 1956.
4. Reduction due to signal loss in built-up areas.
5. The typical urban receiving antenna is less effective than a similar antenna operated in rural areas. Consequently, this value is somewhat less than the typical gains for receiving antennas reported by TASO.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C.

Docket No. 12054

In the Matter of Amendment of Section 3.606, Table of Assignments, Television Broadcast Stations (Columbus, Georgia)

ORDER

At a session of the Federal Communications Commission held at its offices in Washington, D.C., on the 29th day of January, 1960:

The Commission has under consideration: (1) its Report and Order adopted herein July 15, 1959 (FCC 59–721, released July 17, 1959), *inter alia* amending Section 3.606 of the Commission's Rules so as to provide for the addition of Channel 4 to Dothan, Alabama, the addition of Channels 3 and 9 to Columbus, Georgia, and the deletion of Channel 9 at Dothan; and ordering corresponding modification of the licenses of Stations WTVY, Dothan and WRBL–TV and WTVM, Columbus; (2) "Petition for Reconsideration," "Motion for Stay", and "Demand for Hearing", filed between August 14 and August 21, 1959, by WTVY, Inc., *inter alia* asserting that WTVY had previously withdrawn its consent to the modification of its license, and did not now consent thereto but demanded a hearing pursuant to Section 316 of the Communications Act; (3) the Commission's Order adopted September 2, 1959 (FCC 59–910, released September 4, 1959), staying, pending consideration of the matters raised by WTVY, that portion of the earlier Report and Order amending Section 3.606 of the Rules as described above; (4) the Memorandum Opinion and Order adopted herein on December 9, 1959 (FCC 59–1247, released December 14, 1959), which granted WTVY's request for a hearing on the proposed modification and ordered the hearing; (5) "Consent to Modification of License and Request for Termination of Show Cause Proceedings" and "Request for Removal of Stay" filed herein by WTVY on January 25, 1960, withdrawing its demand for a hearing under Section 316, consenting to the modification of its license, and requesting that the stay of the amendment to the Rules be lifted; and (6) the Memorandum Opinion and Order adopted today (FCC 60–80) terminating the proceeding ordered in the December 14, 1959, Memorandum Opinion and Order.

The licensees of the three stations here involved have thus now all consented to the modifications of their licenses under which Station WTVY (Dothan) will change from Channel 9 to Channel 4, WRBL–TV (Columbus) will change from Channel 4 to Channel 3, and WTVM (Columbus) will change from Channel 28 to Channel 9. Today, by separate Order, we have terminated the proceeding instituted on December 14, 1959, in the above referenced Memorandum Opinion and Order. Under the circumstances, there is no reason to delay further the effectiveness of the amendment to Section 3.606 of the Rules.

In view of the foregoing, *It is ordered*, That the stay of the effective date of the amendment to Section 3.606 of the Commission's Rules imposed by our Order of September 2, 1959 (FCC 59–910) is lifted, effective February 1, 1960, and the amendment to Section 3.606 contained in Paragraph 29 of the Report and Order adopted July 15, 1959 (FCC 59–721), and the modifications of the licenses of Stations WTVY, WRBL-TV and WTVM set forth in paragraph 30 of that Report and Order, are made effective February 1, 1960.

It is further ordered, That this proceeding is terminated.

FEDERAL COMMUNICATIONS COMMISSION,
MARY JANE MORRIS, *Secretary*.

Released: February 1, 1960.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, 25, D.C.

Docket No. 13194

In the Matter of Amendment of Section 3.606, Table of Assignments, Television Broadcast Stations, (Corpus Christi, Texas)

REPORT AND ORDER

By the Commission: Commissioner Lee absent.

1. The Commission has before it for consideration the following matters:

(a) The proposal set out in its Notice of Proposed Rule Making, released September 11, 1959 (FCC 59–941), as amended by Orders of the Commission of October 9, 1959 (Mimeo No. 79572) and November 13, 1959 (Mimeo No. 80691), to amend Section 3.606, Table of Assignments, Television Broadcast Stations, as follows:

City	Channel No.	
	Present	Proposed
Corpus Christi, Texas	6+, 10−, *16+, 22, 43	3−, 6+, 10−, *16+, 22, 43

(b) The comments and reply comments, pleadings and petitions, and alternative plans proposed by parties for amendment of the Table of Assignments.

2. The allocation problems presented in this case arise out of the difficulties experienced in the use of UHF channels for the television broadcast service. Corpus Christi, like many other communities throughout the United States, was assigned both VHF and UHF channels.[1] Only the stations on the two VHF channels have survived;[2] and it became important to consider methods for relieving the shortage of competitive facilities which so developed in this market.

3. It was determined that Channel 3 could be efficiently utilized at Corpus Christi; but it was first necessary to secure the consent of the Government of Mexico, in accord with the provisions of the Agreement of 1952 pertaining to television assignments within 250 miles of the border between the United States and Mexico. After prolonged negotiations extending over a period of approximately three years, we concluded an agreement with Mexico which permits the use of Channel 3 at Corpus Christi and, also, Channel 8 at Bakersfield, California, and Channel 12 at Bakersfield or Santa Barbara, California. To accomplish this, it was necessary to make certain adjustments in the Mexican assignments, including the substitution of Channel 2 for Channel 3 at Nuevo Laredo, Tamaulipas.[3] Thus, we are now in a position to finalize the assignment of Channel 3 to Corpus Christi, providing it can be determined that the allocation will meet with public interest criteria.

4. We have considered all of the comments and reply comments submitted by the parties.[4] Support for the proposed amendments comes chiefly from those interested in the establishment of a third commercial VHF station at Corpus Christi; and the opposition comes mainly from Gulf Coast Broadcasting Company, KRIS–TV, Channel 6, and K-Six Television, Inc., KZTV, Channel 10, the licensees of the two commercial VHF stations operating at Corpus Christi. The arguments of the parties may be summarized as follows:

---

[1] Corpus Christi was allocated VHF Channels 6 and 10 and UHF Channels 16, 22, and 43, with Channel 16 reserved for educational purposes.

[2] Television Stations KRIS–TV, Channel 6, and KZTV, Channel 10. Television Station KVDO–TV, Channel 22, left the air in August 1957. The remaining UHF channels (*16 and 43) were never activated.

[3] The agreement now calls for the use of Channel 3 at Corpus Christi and Channel 8 at Bakersfield, California, and Channel 12 at either Bakersfield or Santa Barbara, California, and calls for the following changes in the assignments for Mexico: Piedras Negras, Coahuilla, delete 2 and add 3 and 7; Monterrey, Nuevo Leon, delete 2+ and add 3+; Nuevo Laredo, Tamaulipas, delete 3 and add 2; Saltillo, Coahuila, delete 4− and add 5+; Torreon, Coahuila-Gomez Palacio-Ciudad Lerdo, Durango, add 2+, 4−, 7−, 11−. (Note: Channels 2+, 4−, 7−, and 11− may be used in any community within the triangle formed by Torreon, Gomez Palacio, and Ciudad Lerdo.)

[4] Comments of the American Broadcasting Company were received by the Commission on October 27, 1959. The last day for filing comments was October 26, 1959. ABC petitioned for acceptance of late filed comments. Since good cause was shown and we find that the interests of other parties will not be prejudiced, we accept and have considered ABC's comments.

Supporting arguments

Based upon a study of the growth in population in the Corpus Christi area, there is a demonstrated need for an additional commercial VHF channel in that city. Corpus Christi had a 1950 population of over 100,000; and it is estimated that by 1965 its population will pass the 300,000 mark.

There is immediate assurance that an additional commercial channel will be utilized at Corpus Christi. South Texas Telecasting Corporation and Texas Coast Televisors of Corpus Christi have expressed a desire to apply for Channel 3, in the event it is assigned to Corpus Christi.

If a third service is to be provided to Corpus Christi, a third commercial VHF channel must be made available. The UHF channel assignments for Corpus Christi will not be utilized, for it is impossible for a UHF station to operate in competition with the two established VHF stations in the area.

The assignment of a third VHF channel to Corpus Christi will enhance the opportunities for more effective comptition among the stations operating in that area.

The Commission's plan is the most efficient of the ones being considered.

The Commission's plan can be implemented without waiver of its mileage separation requirements.

Opposing arguments

Statutory considerations, Section 307(b) of the Act, require that the channel be made available to Houston, San Antonio, Galveston, or Austin in preference to Corpus Christi.

Corpus Christi presently enjoys adequate media of mass communications with service from 10 radio stations (7 locally assigned); two television stations; two daily newspapers; and several weekly newspapers.

There is no present shortage of facilities for the networks. None of the three networks has a critical time clearance problem and network advertisers have ample access to this market.

Assignment of Channel 3 to Corpus Christi would forever preclude another VHF channel being made available to Austin, Texas. If the rule making for Corpus Christi is not finalized, Channel 3 at Bryan, Texas, could be relocated in the Elgin-Bastrop area and a station so located would provide city-grade service to Austin and good coverage to Bryan.

Corpus Christi is not a major market and will not support a third commercial VHF station. Closing of military installations in the area accentuates this factor. In 1958, six Corpus Christi stations reported an overall operating loss; and the introduction of the third commercial VHF outlet will seriously affect the present economic situation to the detriment of existing media and the public. The economic problems of he present Corpus Christi VHF stations is serious enough, especially since they must compete with two existing San Antonio stations which utilize tall towers and feed community antenna systems at Port Lavaca and Victoria, Texas.

Maximum power and facilities were obtained by the Corpus Christi VHF stations on the basis that the market would be confined to two VHF outlets. If the third VHF outlet is established, the existing VHF stations would be required to cut back on power and facilities to the detriment of the public.

5. Corpus Christi, with a population (1950 Census) of about 108,000, is a sizeable community. It needs and can effectively utilize an additional VHF channel. Under our proposal herein Channel 3 can be assigned to Corpus Christi in compliance with all rules, including minimum mileage separations. That assignment would provide outlets in Corpus Christi for each of the major TV networks, and thereby improve service to the public, and enhance the opportunities for effective competition among the networks and stations in the Corpus Christi market. Moreover, Channel 3 can now be used at Corpus Christi in accord with our recent agreement with the Government of Mexico. The alternative plans proposed herein would require renegotiation of this agreement and could not be made operative for a number of years, if at all. These basic factors persuade us that adoption of the proposed amendments would be in the public interest.

6. We do not believe there is sufficient merit to the arguments in opposition to warrant the abandonment of the amendments proposed herein. Houston has three commerical (KHOU–TV, Channel 11; KPRC–TV, Channel 2; and KTRK–TV, Channel 13) and a noncommercial educational station (KUHT, Channel 8) in operation. There is a greater need for the additional channel at Corpus

Christi, where it will provide the third VHF outlet, then for a fourth commercial VHF channel at Houston. In addition, Channel 3 can not be efficiently used at Houston where KPRC–TV operates on adjacent Channel 2. Galveston, where one counterproposal envisages the assignment of Channel 3, already receives three services from stations serving the Houston-Galveston area whereas Corpus Christi has no means of obtaining a satifactory third television service from another nearby city. San Antonio also has three commercial VHF stations and a noncommercial educational VHF channel available to it. On the basis of public interest considerations, we favor the assignment of the third VHF channel to Corpus Christi over the assignment of a fourth for San Antonio. Channel 3 cannot be used at Austin unless it is deleted at Bryan, Texas, where it is occupied by KBTX–TV. Television Station KTBC–TV, Channel 7, now serves Austin and we are of the view that the public interest would better be served by the assignment of Channel 3 to Corpus Christi than by shifting Channel 3 from Bryan to Austin, which would preclude the Corpus Christi assignment.

7. We have weighed the remaining arguments submitted by parties opposing the assignment of a third VHF Channel to Corpus Christi—adequacy of present media of mass communications; undesirability of creating opportunities for further competition in the Corpus Christi market; sufficiency of present television facilities to serve the needs of the networks; and desirability of maintaining the status quo and thereby enabling existing VHF stations to operate with maximum power and facilities. We reject them as unpersuasive. We find no merit in the contention that the present media of mass communications are adequate. We are unaware of any proper basis for contending that a community is adequately served by any given number of radio or TV's, or newspapers and that an additional service would fulfill no public need. It seems to us especially difficult to support such a contention with respect to a city the size of Corpus Christi where there are only two operating TV stations.

8. In opposing our proposal for a third VHF station, some parties assert that the establishment of a third station, rather than augmenting service, would reduce it. In support of this contention, it is argued that the existing stations would be so adversely affected that they may have to reduce power and would be curtailing service they are now rendering. We find little basis for anticipating so unusual a result. Nor do we find substance in the arguments that in deciding to go to maximum power an existing station was entitled to rely upon perpetuation of the then existing channel assignments which included only two VHF channels for Corpus Christi. Licenses are granted to operate broadcast stations and provide program service in a field of open competition as plainly contemplated by the Communications Act. It is our view, despite the opposing arguments, that the provision of a third VHF outlet to Corpus Christi will benefit the public, both by adding a new program service and by increasing existing competition among local TV stations.

9. The University of Corpus Christi submits a counterproposal that Channel 3 be reserved for educational purposes.[5] This proposal is supported by a number of the parties, including public officials, civic groups and organizations, and educational leaders and institutions. We have summarized the supporting arguments as well as those which oppose the reservation of the channel for educational purposes. They are as follows:

Supporting arguments

There is a great need for an educational TV station in the Corpus Christi area. There is no existing educational television station to serve Corpus Christi; and it is the only well populated area in the State where such a reservation has not been made.

UHF is impractical for educational purposes at Corpus Christi. There is a lack of UHF conversion in the area; and the public will not purchase UHF sets for the sole purpose of receiving educational programs. Moreover, essential public support for a UHF educational station is not available. On the other hand, funds for an educational VHF station will be readily obtainable from business, industry, and private sources.

---

[5] In a separate pleading, Ben F. McDonald, Jr., suggests that the public interest generally requires that the VHF channel being surrendered at Laredo be reserved for educational use at Corpus Christi. We do not here propose to delete a commercial VHF channel at Laredo. Considerations involved in the designation of Channel 3 as an educational reservation are discussed elsewhere in this Report and Order.

A VHF educational station would serve over one-half million people and provide a suitable outlet for the numerous public and private colleges and schools in the Corpus Christi area; and the public would benefit from the educational programs which would feature the combined efforts of all educational organizations in Corpus Christi.

A VHF educational station would afford an effective medium for classroom and home instruction and, in this way, supplement and aid the overtaxed faculties and facilities of colleges and schools in the area.

An additional VHF channel reservation at Corpus Christi would enhance the opportunities for cooperation among educational stations and foster the growth of an educational television service on a statewide basis.

Commercial facilities cannot fulfill the requirements for educational television. Large blocks of station time on a regular basis are needed and the same are not available from commercial stations.

The highest priority should be given to this request by the educators. Here the need for the first educational reservation outweighs the need for the third commercial outlet for Corpus Christi.

It is most difficult for educational interests to secure sufficient funds to enter into a comparative hearing for an available channel with commercial interests. The outcome of the hearing is too uncertain to form a proper basis for solicitation of public funds and supporting funds for an educational station would be expected to come, in part, from the very persons who are likely to file competing applications for the channel.

Opposing Arguments

The needs of the community for educational programming can be served by three commercial stations operating in Corpus Christi. The third VHF outlet will result in increasing station time available for educational programming.

Plans for the implementation of an educational assignment have not been sufficiently advanced to insure use of the channel for educational purposes; and one can reasonably state that it would be a number of years before the educational station would be built.

The better procedure would be to allow educational interests to apply for the channel and be considered in a comparative proceeding with others interested in its use on a commercial basis.

10. We have considered these arguments with care, and conclude, despite the arguments favoring the reservation, that under the circumstances of this case we cannot set aside the only available VHF channel at Corpus Christi for the exclusive use of the interested educational organizations. An educational station at Corpus Christi on a VHF channel would undoubtedly serve a public need in that area. Its chances of success on the VHF frequencies would be improved over that to be expected from a VHF channel at Corpus Christi, especially in view of the low set conversion figure for that area. There would also be other advantages to reserving the channel, for the reasons specified by the parties and summarized, above.

11. On the other hand, we have been seeking ways to eliminate critical shortages in commercial facilities in a number of important markets. We consider Corpus Christi to be such a market and that there is a need for additional commercial service in that area. Unfortunately, there are not sufficient channels available in the VHF spectrum to accommodate the demand there for both commercial and noncommercial facilities. With this situation before us, we have resolved that the best procedure from the standpoint of the public is to weigh the comparative merits of the proposals of all parties, including applicants for commercial and educational facilities, in an adjudicatory proceeding to determine which applicant is best qualified in the public interest to receive the grant. For these reasons, we must reject the counterproposal of the University of Corpus Christi to reserve Channel 3 for educational purposes.

12. KCOR, Inc., has submitted counterproposals which look toward the assignment of Channel 2 to San Antonio. We have considered the substance of these proposals and many of the arguments in support thereof in our Memorandum Opinion and Order, released March 3, 1958 (FCC 58–187); in our Memorandum Opinion and Order, released December 23, 1958 (FCC 58–1220); and in our Memorandum Opinion and Order, released September 11, 1959 (FCC 59–941).

13. KCOR again refers to the special features of its programming; the need for the fourth commercial VHF station in San Antonio; the impossibility of surviving on UHF in the area in question; and the operating difficulties it has experienced. Its plans, alternatively, call for mileage separation reductions; a

possible change in the boundary line between Zone II and Zone III; and the use of Channel 7 at Corpus Christi in lieu of Channel 3. These proposals are objected to by a number of parties. We summarize the arguments in opposition as follows:

The need for the third commercial VHF assignment at Corpus Christi outweighs the need for the fourth commercial VHF assignment at San Antonio and the desire for the fifth VHF channel at San Antonio should not be allowed to delay the third VHF assignment for Corpus Christi.

The assignment of Channel 2 to San Antonio or 7 to Corpus Christi will require the consent of the Mexican Government. Obtaining these same will require an indefinite, extensive period of time. Moreover, Mexico will not accept the substitution of a high band VHF channel for a low band VHF channel at Nuevo Laredo, as alternatively suggested.

San Antonio is approximately 190 miles from KPRC–TV, Channel 2, Houston, and, consequently, use of Channel 2 at San Antonio would require a substantial reduction in the mileage separation requirements (Zones III, 220 miles) or the use of a tower on the order of 1,800–2,000 feet at a site meeting the applicable 220-mile separation. The use of the high tower involves serious air space problems. Besides, one would not expect a station with its transmitter at pipecreek to be able to effectively compete with the close-in network stations at San Antonio.

Corpus Christi (Post Office) is approximately 173 miles from KTBC–TV, Channel 7, Austin, and, consequently, use of that Channel at Corpus Christi would require a substantial reduction in the mileage separation requirements (Zone III, 220 miles).

The proposal by KCOR to shift the Zone line is unsupported and would not be in the public interest. The Zone in question (Zone III) was established on the basis of sound engineering consideration—tropospheric propagation characteristics in the area adjacent to the Gulf of Mexico—and should not be changed to accommodate a particular assignment or to meet alleged competitive economic needs for improved service in a given case. A zone line should be modified only to correct an error in establishing the original line or where substantial public interest considerations compel its redesignation.

14. We have carefully reviewed all of the arguments in support of, and in opposition to, the proposals of KCOR. Each plan requires the use of Channel 2 at San Antonio, a channel which, as we have shown, is now assigned to Nuevo Laredo under the recently concluded agreement with the Government of Mexico.

15. The use of Channel 3 at Corpus Christi was contingent upon its deletion from Neuvo Laredo. This, in turn, required the concurrence of the Government of Mexico. After three years of negotiation, an agreement was reached and consummated which permits our use of Channel 3 at Corpus Christi. This was achieved only by substituting Channel 2 for Channel 3 at Nuevo Laredo. The substitution of Channel 13 at Nuevo Laredo for Channel 3 was unsatisfactory to Mexico. It appears that the further proposal of KCOR to delete all assignments for that City would be unacceptable.

16. Adoption of any of the suggestions proposed by KCOR would entail renegotiation of the agreement just concluded, and would delay the use of Channel 3 at Corpus Christi or elsewhere within 250 miles of the Mexican Border. Moreover, reopening the agreement as to Channel 3 may, because of other interrelated channel shifts, raise questions concerning the proposed use of Channels 8 and 12 in the State of California, as provided by the present agreement. The ultimate objective would be to provide San Antonio with its fifth VHF channel at the expense of a third for Corpus Christi, a result which, in our opinion, is not warranted under the circumstances of this case.

17. Incidental to its proposed use of Channel 2 at San Antonio KCOR suggests that we assign Channel 2 to San Antonio at a separation less than that required in Zone III and restrict its radiation in the direction of Nuevo Laredo. The distance between San Antonio and Neuvo Laredo is approximately 150 miles. A domestic separation of 220 miles is required in Zone III. Based on our own standards, a derogation on the order of 70 miles would be involved. KCOR cites our actions in Utica, New York, and Miami, Florida, as precedents for its proposal. There was, however, no spacing violation involved in our Channel 2 assignment in Utica. The Canadian Government nevertheless requested that a station on Channel 2 at Utica restricts its radiation toward Canada. A waiver of approximately 5 miles was granted in the Miami case. This permitted the Board of Public Instruction of Dade County, Florida, licensee of

WTHS–TV, Channel 2, to locate its tower at the antenna farm. Telrad, Inc., licensee of WESH–TV, Channel 2, Daytona Beach, Florida, consented, in advance, to the action taken in that case. In neither instance was anything approaching a 70-mile shortage invloved; and nothing in those cases suggests the desirability or the practicability of the short spacing proposed by KCOR.

18. Alternatively, KCOR proposes that we amend the boundary line between Zone II and Zone III by shifting its approximately 22 miles southeast of its present location in the vicinity of San Antonio. This would permit the antenna of the proposed Channel 2 station at San Antonio to be positioned closer to that City and relieve the requirement for a tower of approximately 1,800 feet. Moreover, it would permit the use of Channel 7 at Corpus Christi at a site approximately 15 miles south of the City.

19. The boundary line between Zone II and Zone III was established in recognition of the tropospheric propagation characteristics in the region adjacent to the Gulf of Mexico. Being so based, that boundary cannot appropriately be shifted without referring to propagation phenomena, merely to make possible an individual channel assignment otherwise excluded. KCOR does not contend that the Zone boundary was located erroneously on the basis of the engineering considerations which determined its location, and it would not be appropriate to shift it for the purpose of overcoming the separation problems discussed above. Moreover, a shift in thhe location of a boundary line would not eliminate the necessity of obtaining the consent of the Mexican Government to the assignment of Channel 2 at San Antonio.

20. KCOR additionally suggests that Channel 7 be used at Corpus Christi in lieu of Channel 3. This would require changes in the Mexican assignments at Piedras Negras, Matamoros, and Monterrey and would involve a shortage between the proposed Channel 7 station at Corpus Christi and KTBC–TV, Channel 7, at Austin. Austin and Corpus Christi are approximately 170 miles apart. The KTBC–TV transmitter is close to the northwest edge of Austin. In order to meet mileage separation requirements (220 miles in Zone III), the Channel 7 transmitter at Corpus Christi would have to be located approximately 50 miles south of that City. This would not be a feasible allocation under the circumstances of this case. Furthermore, we would have to renegotiate our present agreement with Mexico. In these circumstances we consider the proposal herein distinctly preferable to the use of Channel 7 at Corpus Christi as proposed by KCOR.

21. In the light of all the above-mentioned considerations, including the matters discussed in the above-cited Memorandum Opinions and Orders, we deny KCOR's counterproposal to have Channel 2 assigned to San Antonio. Insofar as KCOR has petitioned for alternative relief in connection with its proposed use of Channel 2 at San Antonio, such requests for alternative relief are also denied.

22. D. W. Strahan proposes that Channel 3 be assigned to the Kingsville-Alice area in lieu of Corpus Christi. He argues that the need for a first local outlet in these communities is greater than for the establishment of the third VHF station at Corpus Christi; that advertisers in the area in question will be better served; and that Kingsville and Alice are growing in population and economic importance and require the channel.

23. Alice is approximately 40 miles west of Corpus Christi and Kingsville approximately 30 miles southwest of the City. Alice and Kingsville are approximately 20 miles apart. These cities had a combined 1950 population of 33,347 compared to 108,287 for Corpus Christi. Alice and Kingsville would receive a Grade B or better service from a Channel 3 station at Corpus Christi, depending on the location of the Corpus Christi station and the height and power used by it. It is our view that the opportunities for establishing a third service to this area will be enhanced if the allocation is made to Corpus Christi. This is in keeping with our objective in making assignments to major markets in which there are shortages of competitively comparable facilities. In our opinion, Corpus Christi is such a market and has greater need for the channel than either Alice or Kingsville, or Alice and Kingsville combined. We further believe that the accessibility of Corpus Christi stations to local advertisers will be improved by making available the third outlet in Corpus Christi.

24. K–Six Television, Inc., licensee of KZTV, Channel 10 at Corpus Christi, requests that an adjudicatory hearing be held in conjunction with the instant rulemaking to determine whether the allocation of Channel 3 to Corpus Christi would result in such economic injury to its station, KZTV, as to damage or destroy its ability to provide service consistent with the public interest. Com-

ments in opposition argue that an evidentiary hearing is not required in rule making cases. A party is entitled to comment, it is said, but exhausts its rights by the filing of such comments.

25. We find nothing in the Communications Act, court decisions or past practices which supports K-Six's contention that in making decisions as to whether the Table of Assignments should be amended to assign Channel 3 to Corpus Christi "the Commission must grant a hearing [adjudicatory] to K-Six Television, Inc., to determine whether the allocation of Channel 3 to Corpus Christi would result in such economic injury to KZTV as to damage or destroy its ability to provide service consistent with the public interest." K-Six, as the licensee of a VHF station in Corpus Christi, is not entitled to protection against the financial or economic effects of competition added by the assignment of an additional VHF channel or the authorization of a third VHF station in Corpus Christi. The separate question of whether service to the public would be adversely affected by establishing a third TV outlet in Corpus Christi as claimed in the comments submitted by K-Six in this proceeding, has already been considered and disposed of. Whatever rights K-Six may have to press its point in such adjudicatory proceedings as may follow concerning subsequent authorizations to build a station on Channel 3 at Corpus Christi, K-Six does not have the right to demand the adjudication of that question in an evidentiary proceeding incidental to a decision on the question under consideration herein of whether Channel 3 should be assigned to Corpus Christi.

26. In the preceding paragraphs of this Report and Order, we have examined all of the reasons of substance advanced by the parties for adoption, modification, or rejection of the proposed amendments. On the basis of the record before us and in conformity with our findings set forth above, we are of the view that adoption of the proposed amendments is in the public interest.

27. Authority for the adoption of the amendments herein is contained in Sections 4(i), 303 and 307(b) of the Communications Act of 1934, as amended.

28. In view of the foregoing, IT IS ORDERED, That effective March 7, 1960, Section 3.606 of the Rules IS AMENDED, insofar as the community named is concerned, to read as follows:

City: Corpus Christi, Texas.
Channel No.: 3—, 6+, 10—, *16+, 22, 43.

FEDERAL COMMUNICATIONS COMMISSION,
MARY JANE MORRIS, *Secretary.*

Adopted: January 27, 1960.
Released: January 29, 1960.

NOTE.—Rules change herein will be covered by Transmittal Sheet III–4.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON 25, D.C.

Docket No. 13374

In the Matter of Amendment of Section 3.606, Table of Assignments, Television Broadcast Stations (Grand Rapids, Cadillac, Traverse City, and Alpena, Michigan)

NOTICE OF PROPOSED RULEMAKING

1. The Commission has under consideration the amendment of Section 3.606, Table of Assignments, so as to provide an additional VHF channel assignment to Grand Rapids, Michigan, together with certain incidental and alternative reassignments which have been suggested in petitions for rulemaking referred to below.

2. In a statement submitted to the Senate Committee on Interstate and Foreign Commerce on April 17, 1959, by the Chairman of the Commission, it was announced that the Commission is pursuing studies and negotiations needed to ascertain the practicability of four alternative approaches to basic revision of television allocations. Each of these four alternatives contemplates long-range reallocations which would require a period of years to effectuate if it were found desirable and practicable to adopt it.

3. Recognizing the urgency of taking such action in the interim as would relieve the pressing scarcities of channel assignments needed to provide at least three competitive television services in the major markets, the Commission announced

also that, in view of the practical limitations on the utilization of UHF channels for this purpose, it would endeavor to make such increased use of VHF frequencies as could be justified in the light of the circumstances existing in particular markets. Because of the large number of persons affected, the Commission indicated that this need is pressing in the larger markets which have so far been unable to obtain three competitive television services.

4. Recognition was also given to the near exhaustion of possibilities for making VHF assignments in such markets which would meet the minimum separation requirements which were established in the Rules in 1952, and have been adhered to since that time, with negligible exceptions. The Commission continues to regard the standard minimum separations as a necessary and important factor governing the utilization of television channels generally under the existing nationwide allocations scheme. Owing, however, to the urgency of relieving serious shortages, the Commission announced that it will consider, in appropriate cases, limited and specific exceptions to the existing minimum separation requirements.

5. One of the important markets which at present is served by only two local VHF outlets is the Grand Rapids-Kalamazoo market, which ranks thirtieth among among the television markets in the United States. It is possible to assign an additional VHF channel for a commercial television station at Grand Rapids, using one of three alternative methods below. This market, because of its size, calls for the earliest possible action to provide an additional VHF outlet; and we herein invite comments on the following alternative methods of accomplishing this objective:

ALTERNATIVE NO. 1

City	Channel No.	
	Present	Proposed
Grand Rapids, Mich	8+, *17+, 23−	8+, 13−, *17+, 23−.
Cadillac, Mich	13−, 45	7+, 45.
Traverse City, Mich	7+, 20−, *26+	9+, 20−, *26+.
Alpena, Mich	9+, *11, 30−	3, *11, 30−.

ALTERNATIVE NO. 2

Grand Rapids, Mich	8+, *17+, 23−	8+, 13−, *17+, 23−.
Cadillac, Mich	13−, 45	9, 45.
Alpena, Mich	9+, *11, 30−	11, *13, 30−.

ALTERNATIVE NO. 3

Grand Rapids, Mich	8+, *17+, 23−	8+, 11+, *17+, 23−.
Marinette, Wis	11+, 32−, *38+	11−, 32−, *38+.

6. Alternative No. 1 would involve the following changes in stations now operating: Fetzer Television, Inc., licensee of Station WWTV, would shift from Channel 13 to Channel 7 at Cadillac, with a resultant short separation, on the order of 156 miles to Station WXYZ-TV, Channel 7, Detroit, Mich., licensed to WXYZ, Inc. The licensee of Station WPBN-TV would shift from Channel 7 to Channel 9 at Traverse City. No short separation is involved there. The City of Grand Rapids where it is suggested Channel 13 may be utilized is less than the required minimum separation from Station WSPD-TV where Channel 13 is also assigned.

7. Alternative No. 2 was outlined (without the offsets indicated above) in the petition for rulemaking filed on November 5, 1959 (RM–148) by Atlas Broadcasting Company. It would require Fetzer Television, Inc., WWTV, Channel 13, Cadillac, Mich., to shift from Channel 13 to Channel 9. In order to avoid less than the minimum separation between a Channel 13 station at Grand Rapids and cochannel Station WSPD–TV at Toledo, the petitioner suggest location of the transmitter site 25 miles northwest of Grand Rapids. The present transmitter site of Station WWTV, Cadillac, Mich., which would

shift to Channel 9, is about 180 miles from CKLW–TV, now operating on Channel 9 at Windsor, Ontario. Alpena, where it is suggested that Channel 13 may be utilized is approximately 180 miles from cochannel Station CKCO–TV, Kitchener, Ontario.

8. The Atlas petition is supported by ABC and Peninsular Broadcasting Company, generally, on the grounds of the importance of the Grand Rapids market and the need for a third commercial VHF facility in the area. It is opposed by Fetzer Television, Inc., chiefly on the grounds of the costs that would be imposed on Fetzer in shifting from Channel 13 to Channel 9. Fetzer does not oppose the concept of an additional television channel assignment to the Grand Rapids, Mich., area which would meet all of the requirements of the Commission's rules. The Association of Maximum Service Telecasters, Inc., opposes the assignment of Channel 13 at Grand Rapids at short spacing.

9. Alternative No. 3 would require no channel shifts of existing stations but would involve locating the transmitter of the new Grand Rapids station at less than the minimum 170 mile separation to cochannel Stations WTTW at Chicago and WTOL–TV at Toledo. It would require Station WLUK–TV at Marinette to change its offset operation from Channel 11 plus to Channel 11 minus.

10. Additionally, it should be noted that Alternatives 1 and 2 call for the substitution of another VHF channel for Channel 9 now assigned to Alpena, Michigan (Channel 3 under Alternative No. 1 and Channel 11 under Alternative No. 2) the latter in turn requiring the drop-in of *13 for education use at Alpena in lieu of Channel *11 now assigned to Alpena for education. Lake Huron Broadcasting Corporation and Gerity Broadcasting Company have applications pending for Channel 9 at Alpena, Michigan. If alternative No. 1 or No. 2 is adopted, the applicants would be able to amend their respective applications to specify operation on Channel 3 or Channel 11 in lieu of Channel 9. No short separation is involved here.

11. Additionally, there are pending before the Commission pleadings filed by the Superintendent of Public Instruction for the State of Michigan seeking the provision of a VHF noncommercial educational assignment at Cadillac, Michigan. In an amendment filed on September 8, 1959, to the Superintendent's original petition, it is sought to accomplish this, as indicated below:

City	Channel numbers	
	Present	Proposed
Alpena, Mich	9+, *11, 30–	*6, 11, 30–.
Cadillac, Mich	13–, 45	*9, 13–, 45.

This plan conflicts with alternatives Nos. 1 and 2, above. It does not conflict with alternative No. 3. Petitioner observes that since no VHF channel is now available for educational use in the north central portion of Michigan, the allocation of Channel 9 to the Cadillac area would provide an important and key outlet for the educational television network in this thickly populated area. As in the case of alternative 2, above, adoption of this plan would involve amendment of the pending applications for Channel 9 at Alpena to apply for Channel 11 instead.

12. We are of the opinion that the public interest would be served by considering in this proceeding the Superintendent's amended allocation plan and accordingly, invite comments thereon.

13. In separate rulemaking proceedings (Docket No. 13340) initiated on January 4, 1960, the Commission announced its tentative plan to require any new station assigned at the substandard co-channel separation to suppress radiation in the direction of the existing station to the extent necessary to ensure that such new station creates no more interference to the existing station than would be caused if both stations were operating at the standard minimum spacing permitted under Section 3.610 of the Rules, and with maximum antenna height and power. In addition, the Commission, in Docket No. 13340 suggested the adoption of new engineering standards, including propagation and interference curves; values required for principal city service and service to "normal service areas." Additionally, the Commission's suggestion prescribed the methods to be

used in ascertaining the degree of power suppression required to afford equivalent protection to existing stations and the means to be used in achieving such suppression. Comments are invited on the channel reassignments under consideration herein, in the light of the Commission's proposals in Docket 13340 relating to engineering standards and methods. We note in this connection that substandard spacings are contemplated in Alternative Plans Nos. 1 and 3. With respect to Alternative Plan No. 2 it is noted that, as outlined by the petitioner (Atlas) this plan does not envisage short spaced separations. However, since that plan would require locating the new Channel 13 transmitter at least 25 miles northwest of Grand Rapids, and at an even greater distance from Kalamazoo (which is recognized by the industry as forming part of a combined Grand Rapids-Kalamazoo television market) it may be desirable, if the plan of channel reassignments suggested in Plan No. 2 were adopted, to permit the new Channel 13 station at Grand Rapids to locate its transmitter farther south with a resultant short separation to co-channel Station WSPD-TV at Toledo. Comments are invited on this alternative possibility.

14. All the plans under consideration herein contemplate changes in channel assignments which, under the United States-Canadian Agreement on border assignments require clearance with the Canadian Government. The Commission will initiate appropriate steps in compliance therewith.

15. Authority for the adoption of the amendments under consideration is contained in Sections 4(i), 303, and 307(b) of the Communications Act of 1934, as amended. In view of the fact that some of the channel reassignments under consideration in this proceeding may affect outstanding authorizations for television stations, we proposed herein to determine first whether the public interest would be served by adopting any of the alternative plans. If we so determine, the Commission would then take such further procedural steps as may be appropriate to afford full protection to the rights of existing station licensees, before adopting or making effective any revisions to the present channel assignments.

16. All interested persons are invited to file, on or before April 19, 1960, comments supporting or opposing the proposals set out in this Notice and in the Appendices hereto, or submitting any modifications or counterproposals the parties may wish to submit. Comments in reply thereto may be submitted by May 4, 1960. The Commission will consider all comments filed hereunder prior to taking final action in this matter provided that, notwithstanding the provisions of Section 1.213 of the Rules, the Commission will not be limited solely to the comments filed in this proceeding.

17. In accordance with the provisions of Section 1.54 of the Commission's Rules and Regulations, an original and 14 copies of all statements, briefs, or comments shall be furnished to the Commission.

FEDERAL COMMUNICATIONS COMMISSION,[1]
MARY JANE MORRIS, *Secretary.*

Adopted: January 27, 1960.
Released: February 1, 1960.

DISSENTING STATEMENT OF COMMISSIONER BARTLEY

I dissent. In my judgment, any action looking to the implementation of short-spaced cochannel assignments on a case-by-case basis during the pendency of the Commission's outstanding Notice of Proposed Rule Making in Docket No. 13340, and based on *proposed* new curves and on *proposed* criteria set forth therein, is premature, and may very well be vitiated by further action of the Commission in that docket. Moreover, the institution of Rule Making Proceedings on a case-by-case basis in an effort to expedite the effectuation of the proposed interim policy which involves problems, both complex and broad in scope, can only result in the filing of superfluous and perhaps futile pleadings and proposals, which in my judgment, will not best conduce to the proper dispatch of business.

---

[1] Commissioner Hyde dissenting.
See attached Dissenting Statement of Commissioner Bartley.
See attached Dissenting Opinion of Commissioner Lee.
See attached Statement of Commissioner Ford.

DISSENTING OPINION OF COMMISSIONER ROBERT E. LEE

I dissent to the adoption of this Notice of Proposed Rule Making which requires substandard spacings between television stations for its implementation. I fail to comprehend the pressing need to add a single VHF channel to the Grand Rapids-Kalamazoo market at this time.

This action purports to be an integral part of the Commission's so-called interim plan. The interim plan itself is illogical and premature in the absence of a feasible long-range plan.[1] In addition, it is based upon criteria so indefinite that those most intimately familiar with it will have difficulty in applying them to any particular set of facts. Moreover, the vagueness of these criteria make them particularly susceptible to arbitrary action.

In the instant Notice, the Commission proposes to rely upon its own formulae for short spacings. These formulae were proposed on its own motion in the rulemaking proceeding initiated in Docket 13340 as recently as January 4, 1960. Without the benefit of any comments and without having made the necessary determination that the proposed formulae and criteria would serve as adequate bases for adding substandard assignments, the Commission proposes to utilize them in making allocations to so-called important markets.[2] Because of the impact of substandard spacings upon the entire television broadcast industry, I am of the view that today's action is premature and unwarranted.

Can the Commission possibly consider that the contemplated substandard VHF stations, limited in power to afford "protection" to cochannel stations and subjected to unrestricted interference from maximum facility stations, will be competitive with the maximum facility stations in the same market? I sincerely believe not.

Can the highly suppressive (20 db) directional antennas contemplated by the Commission in its proposal give more than theoretical protection to stations which they purport to protect and also render adequate service to the areas intended to be served? The limited information and data presently before the Commission would appear to indicate a negative answer.

Until I am certain of some of the answers to the above questions, I am unwilling to embark down the substandard spacing road.

I fully realize that our television allocations problem has gone without a solution far too long already. Nevertheless, the so-called interim plan must mesh with the long-range plan or the former will in fact become the long-range solution—whether we like it or not.

STATEMENT OF COMMISSIONER FORD

I concur in the proposed notice; however, I dissent to the provisions of paragraph 16.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON 25, D.C.

Docket No. 11957

In the Matter of Amendment of Section 3.606, Table of Assignments, Television Broadcast Stations (Providence, Rhode Island; New Haven, Connecticut; Portland, Maine; and Orono, Maine).

MEMORANDUM OPINION AND ORDER

By the Commission: Commissioner Lee absent.

1. The Commission has before it for consideration its Report and Order in Docket No. 11957, released October 31, 1958 (FCC 58–1023), and a Petition for Reconsideration filed by Channel 16 of Rhode Island, Inc., on December 1, 1958, which requests reconsideration of the Commission's Report and Order, above, denying the proposals for the assignment of a third VHF channel to Providence,

---

[1] It is especially premature when, as I have been led to believe, the Commission is on the brink of the culmination of negotiations with the Executive Department needed to ascertain the practicability of four alternative approaches to basic revisions of the television allocation plan.

[2] It will be extremely difficult to explain to a taxpayer that the Government is now allocating competitive television facilities only to "important" television markets and that his market did not qualify even though it may possess the requisite economic base for a competitive television service. Aside from this, I have difficulty in discriminating between the needs of the people in the 30th and the 80th market, for example, solely on the basis of television market rank alone.

Rhode Island. The Commission today released a Notice of Proposed Rule Making, Docket No. 13375, looking toward the assignment of Channel 6 to Providence, Rhode Island. In view of this proposed action, it is deemed desirable to dispose at the same time of the Petition for Reconsideration in the instant proceeding.

2. The Commission originally initiated these proceedings to explore the merits of assigning a third VHF channel to the Providence area by a method contingent on the move of Channel 6 from Schenectady to Syracuse, New York, which was then proposed in the Albany-Schenectady-Troy deintermixture case, Docket No. 11751.[1] Our subsequent decision to retain Channel 6 at Schenectady [2] foreclosed adoption of the contingent proposal for Providence. On September 9, 1957, we invited comments on an alternate proposal which would add a third VHF channel to Providence by changing channel assignments as follows:

City	Channel numbers	
	Present	Proposed
Providence, R.I.	10+, 12+, 16, *36+	8+, 10+, 13+, 16, *36+.
New Haven, Conn.	8+, 59+	12+, 59+.
Portland, Maine	6−, 13+, *47−, 53+	6−, 12−, *47−, 53+.
Orono, Maine	*12−	*11−.

After careful consideration of all of the public interest factors, we concluded that the public interest would not be served by adoption of the above proposal or any of the counterproposals submitted during the course of the proceeding. Accordingly, we ordered the proceeding terminated.

3. Petitioner challenges our decision on five grounds which will be dealt with separately. First, it is said that the Commission ignored its own finding with respect to the need for the assignment at Providence. We did not ignore the need for the assignment in question. We acknowledged it (See Paragraph 7); but in weighing the need at Providence against the contingent changes required to permit the assignment of the third VHF station to the area under the proposed plan, we concluded the public interest would not be served by adoption of the plan. For example, at Paragraph 10, we found that the assignment of Channel 13 to Providence would require Station WGAN–TV at Portland to operate on Channel 12 instead of Channel 13. It further required shifting Station WNHC–TV at New Haven from Channel 8 to Channel 12, and relocation of the station's transmitter site. There were further findings with respect to conflicts with proposed educational station plans (Paragraphs 11 and 17); airspace problems (Paragraphs 9, 13 and 15); and as to the feasibility or practicability of assigning Channels 8 and 13 to Providence in view of the fact that the stations would have to be located at substantial distances from that City (Paragraphs 8 and 14). These and other facts are amply set forth in our Report and Order; and, in our opinion, constitute a sufficient basis for our ultimate determination to reject the proposal.

4. Petitioner further states that the Commission failed to make findings and conclusions on pertinent and uncontroverted facts which would have required adoption of the rulemaking proposal. Petitioner does not specify which facts it has reference to. In any event, petitioner's contention is erroneous since our decision was based on painstaking consideration of all the relevant facts.

5. The petitioner's second contention charges error in failing and refusing to find that the assignment of Channels 8 and 13 to Providence would be consistent with the Commission's mileage separation and coverage requirements; that it would improve competition among a greater number of stations; and that it would not constitute a hazard to air navigation. At Paragraph 8, we specifically found that the assignment of Channels 8 and 13 may be assigned to Providence in conformity with separation and principal city coverage requirements of the Commission's Rules. We were not convinced, however, that the assignment would improve competition among a greater number of stations. In this connection, we pointed out that the new stations operating on Channels 8 and 13 would have to be located at substantial distances from the City of Providence

[1] Notice of Proposed Rule Making released March 25, 1957, Docket No. 11957 (FCC 57–265).

[2] Report and Order released September 9, 1957, Docket No. 11751, 15 Pike & Fischer RR 1514a.

(Paragraph 8), whereas the transmitters of Stations WJAR–TV on Channel 10 and WPRO on Channel 12 at Providence are now located in close proximity to the city. The other dislocations and channel changes necessitated by the proposal led us to an overall conclusion that there was no basis for such a determination on the record in the case. See Paragraphs 14 and 15.

6. With respect to the aeronautical hazard questions, we adequately treated these matters in the findings and conclusions. See Paragraphs 9, 15, and 16. We concluded, in part, that from the record it was impossible to tell whether aeronautical hazards and limitations would preclude utilization of any particular antenna sites for Channels 8 and 13 facilities in the general areas south and east of Providence, Paragraph 15. Under the circumstances, fully set forth in our findings, we concluded that the air hazard problem was one factor to be weighed in deciding whether to adopt the rulemaking or not. We believe it would have been error for us to have concluded, as petitioner would have us do, that the assignment of the new stations would not constitute a hazard to air navigation. The record would not support such a finding. We adhere to the findings and conclusions set forth in this regard in the Report and Order.

7. The third contention is embodied in the second, discussed above, and relates to the Commission's reliance on the uncertainty of the air hazard question. These matters are covered at Paragraph 6, above. In addition, we refer to the conclusions at Paragraph 15 of the Report and Order where we specifically called attention to the distinction in cases involving a "dropin" and the instant one which required a number of dislocations and channel shifts to existing stations. We emphasized the fact that Station WPRO–TV would be required to shift to either Channel 8 or 13 and to move its present antenna site to an area where it was questionable whether a satisfactory site could be found meeting requisite spacing and coverage requirements because of aeronautical considerations. We distinguished the instant case from the Miami (Docket No. 11756) and Norfolk (Docket No. 11750) situations where "dropins" were involved and it was left to a later date, during the adjudicatory phases of the proceeding, to determine site feasiblity. We adhere to our conclusion that, all factors considered, the instant case was not one in which the site question should have been left for speculative, future resolution at the expense of an existing licensee, especially where changes in channel assignments in other communities would be required, involving changes in the frequencies and dislocation of existing stations and service to the public. See Paragraph 15. For these reasons, we adhere to the findings and conclusions in this regard set forth in our Report and Order.

8. The petitioner's fourth contention is that the Commission's reliance on the separation between Channel 8 in Providence and the proposed site of Station WNAC–TV on adjacent Channel 7 is a violation of Section 307(b) of the Act and the Commission's Rules. The particular section of the Rules on which reliance is placed is not mentioned. We did consider the proposed move of Station WNAC–TV to locate its Channel 7 facility in the "antenna farm" area south of Boston. The other two Boston VHF commercial stations are located there. See Paragraphs 14 and 16. Under the circumstances of the case, we believe we properly consider the proposed WNAC–TV move as *one* of the factors entering into an overall public interest determination in this rulemaking case. The service WNAC–TV would be able to render to the people of Boston from its improved position at the antenna farm is an element in the overall picture. We conclude that we were not in error in considering the contentions of RKO Teleradio Pictures, Inc., licensee of WNAC–TV, in this connection, either by virtue of Section 307(b) of the Act or by Commission Rule. We, therefore, adhere to our findings and conclusions in this regard.

9. Petitioner's fifth contention is that the Commission erred in failing to state its reasons for rejecting the proposal to assign Channel 8 and 13 at lesser separations. The rulemaking proposal in its inception was designed to maintain the established mileage separation specified in Section 3.610 and the limitations on the use of directional antennas set out in Section 3.685(e) of the Rules. In our Notice of Proposed Rule Making, Docket No. 13375, which looks toward the assignment of Channel 6 to Providence, reference is made to suggested engineering standards which may be utilized to govern the use of channels at substandard separations. These prescribed methods were not in contemplation at the time the instant rulemaking was considered and waivers of our Rule to permit the use of Channels 8 and 13 at substandard separations were not within the scope of the instant proceedings. Thus, the Commission was not bound, and did not

intend, to consider that which went beyond the reasonable limits of the plan set out in its Notice and was in contravention of its established rules and policies in force at that time.

For the foregoing reasons, we adhere to our position and the statement of our reasons as set out in the Report and Order in question.

10. The Commission is mindful of the needs of the Providence area.

We believe that the plan set forth in our Notice of Proposed Rule Making in Docket No. 13375, looking toward the assignment of Channel 6 to that area, is preferable to the plan envisaged in the instant case.

11. In view of the foregoing, we conclude that the Petition for Reconsideration filed by Channel 16 of Rhode Island, Inc., must be denied. We reaffirm our decision announced in our October 31, 1958, Report and Order that the proceeding be terminated.

12. Accordingly, IT IS ORDERED, That the Petition for Reconsideration IS DENIED and this proceeding BE TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION,
MARY JANE MORRIS, *Secretary.*

Adopted: January 27, 1960.
Released: January 29, 1960.

BEFORE THE FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON 25, D.C.

Docket No. 13375

In the Matter of Amendment of Section 3.606, Table of Assignments, Television Broadcast Stations (Providence, Rhode Island, and New Bedford, Massachusetts).

NOTICE OF PROPOSED RULE MAKING

1. Comments are invited in the above-entitled matter looking toward amendment of Section 3.606, Table of Assignments, Television Broadcast Stations, in the following respects:

City	Channel numbers	
	Present	Proposed
Providence, R.I.	10+, 12+, 16, *36+	6+, 10+, 12+, 16, *36+.
New Bedford, Mass.	6+, 28−, 34+	28−, 34+.

2. In a statement submitted to the Senate Committee on Interstate and Foreign Commerce on April 17, 1959, by the Chairman of the Commission, it was announced that the Commission is pursuing studies and negotiations needed to ascertain the practicability of four alternative approaches to basic revision of television allocations. Each of these four alternatives contemplates long-range reallocations which would require a period of years to effectuate, if it were found desirable and practicable to adopt it.

3. Recognizing the urgency of taking such action in the interim as would relieve pressing scarcities of channel assignments needed to provide at least three competitive television services in the major markets, the Commission announced also that, in view of the practical limitations on the utilization of UHF channels for this purpose, it would endeavor to make such increased use of VHF frequencies as could be justified in the light of the circumstances existing in particular markets. Because of the large numbers of persons affected, the Commission indicated that this need is pressing in the larger markets which have so far been unable to obtain three competitive television services.

4. Recognition was also given to the near exhaustion of possibilities for making VHF assignments in such markets which would meet the minimum separation requirements which were established in the Rules in 1952, and have been adhered to since that time, with negligible exceptions. The Commission continues to regard the standard minimum separations as a necessary and important factor governing the utilization of television channels generally under the existing nationwide allocations scheme. Owing, however, to the urgency of relieving

serious shortages, the Commission announced that it will consider, in appropriate cases, limited and specific exceptions to the existing minimum separation requirements.

5. One of the most important markets which at present is served by only two local VHF outlets is Providence which is the 19th ranking metropolitan area in the country and has a city population of 248,674 and a standard metropolitan area population of 737,203. This market, because of its size and importance, calls for the earliest possible action to provide an additional VHF outlet in conformity with our announced policies for interim television allocations set out in Docket 13340. While the Providence assignment would necessarily require withdrawal of the present assignment of Channel 6 to New Bedford, we note that New Bedford is a much smaller city ranking as the 123rd metropolitan area with a city population of 109,189 and a standard metropolitan area population of 137,469. Cochannel stations are in operation at Schenectady, New York (WRGB), Portland, Maine (WCSH–TV) and WHDH operates on adjacent Channel 5 at Boston, Massachusetts. Since these stations are approximately 144, 145, and 33 miles, respectively, from Providence, it appears impossible to locate a transmitter for Channel 6 at Providence at the minimum cochannel spacing provided in the rules and still provide a principal city signal to Providence. In these circumstances we propose to consider the addition of Channel 6 to Providence and permitting its use at a site less than 170 miles from cochannel stations under the conditions set forth in Docket 13340.

6. It will be recalled that the Commission had before it in Docket No. 11957[1] a plan to provide Providence with an additional VHF channel. The plan required the deletion of Channel 12 at Providence and the addition of Channels 8 and 13. After careful consideration, the Commission determined that the addition of a channel under the plan proposed would require dislocation of existing services and channel shifts to a degree not consonant with the public interest. At the time, the plan was limited by the Commission's policy of maintaining the 170 mile separation requirement. A review of the proposed rulemaking in Docket No. 11957, together with alternative possibilities for the addition of a VHF channel at Providence, has been conducted in light of the Commission's decision to consider waiver of its mileage separation requirements in cases of critical shortages. It is believed that the proposed set out in the instant Notice would best serve the public interest, as it will require less disruption to existing services than any alternative solution to the problem.

7. In separate rulemaking proceedings (Docket No. 13340) initiated on January 4, 1960, the Commission announced its proposal to require any new station assigned at a substandard cochannel separation to suppress radiation in the direction of the existing station to the extent necessary to ensure that such new station creates no more interference to the existing station than would be caused if both stations were operating at the standard minimum spacing permitted under Section 3.610 of the Rules, and with maximum antenna height and power. In addition, the Commission in Docket No. 13340 proposed the adoption of new engineering standards, including propagation and interference curves; values required for principal city service and service to "normal service areas". Additionally the Commission's suggestion prescribed the methods to be used in ascertaining the degree of power suppression required to afford equivalent protection to existing stations and the means to be used in achieving such suppression. Comments are invited on the channel reassignment under consideration herein, in the light of the Commission's proposals in Docket 13340 relating to engineering standards and methods.

8. The Commission is of the view that a rulemaking proceeding should be instituted and that interested parties should be invited to file comments on the desirability of reassigning Channel 6 from New Bedford to Providence.

9. Authority for the adoption of the amendments under consideration is contained in Sections 4(i), 303 and 307(b) of the Communications Act of 1934, as amended. In view of the fact that some of the channel reassignments under consideration in this proceeding may affect outstanding authorizations for television stations, we propose herein to determine first whether the public interest would be served by providing a third VHF outlet for Providence on Channel 6. If we so determine, the Commission would then take such further procedural steps as may be appropriate to afford full protection to the rights of existing

[1] See Report and Order, Docket No. 11957, released October 31, 1958 (FCC 58–1023).

station licensees, before adopting or making effective any revisions to the present channel assignments.

10. All interested persons are invited to file, on or before April 19, 1960, comments supporting or opposing the proposals set out in this Notice and in the Appendices hereto, or submitting any modifications or counterproposals the parties may wish to submit. Comments in reply thereto may be submitted by May 4, 1960. The Commission will consider all comments filed hereunder prior to taking final action in this matter provided that, notwithstanding the provisions of Section 1.213 of the Rules, the Commission will not be limited solely to the comments filed in this proceeding.

11. In accordance with the provisions of Section 1.54 of the Commission's Rules and Regulations, an original and 14 copies of all statements, briefs, or comments shall be furnished to the Commission.

FEDERAL COMMUNICATIONS COMMISSION,[2]
MARY JANE MORRIS, *Secretary.*

Adopted: January 27, 1960.
Released: January 29, 1960.

DISSENTING STATEMENT OF COMMISSIONER BARTLEY

I dissent. In my judgment, any action looking to the implementation of short-spaced cochannel assignments on a case-by-case basis during the pendency of the Commission's outstanding Notice of Proposed Rule Making in Docket No. 13340, and based on *proposed* new curves and on *proposed* criteria set forth therein, is premature, and may very well be vitiated by further action of the Commission in that docket. Moreover, the institution of Rule Making Proceedings on a case-by-case basis in an effort to expedite the effectuation of the proposed interim policy which involves problems, both complex and broad in scope, can only result in the filing of superfluous and perhaps futile pleadings and proposals, which in my judgment, will not best conduce to the proper dispatch of business.

STATEMENT OF COMMISSIONER FORD

I concur in the proposed notice; however, I dissent to the provisions of paragraph 10.

(b) CORRESPONDENCE AND OTHER DOCUMENTS RELATING TO THE RECOMMENDATIONS OF KENNETH A. NORTON

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
BOULDER LABORATORIES,
Boulder, Colo., March 27, 1959.

Hon. JOHN C. DOERFER,
Chairman, Federal Communications Commission,
Washington, D.C.

DEAR MR. DOERFER: Recently you were given a report of the Television Allocations Study Organization which included a summary statement prepared by Dr. George Town. This report and summary mention the role of the National Bureau of Standards in this extensive and valuable engineering study. We have so far seen Dr. Town's summary as published in Broadcasting, but have not yet seen all of the remainder of the report in its final form. The parts of the report we have studied seem to us to represent a very valuable addition to the available information in this field. While most of the conclusions reached are not qualitatively new, the study has provided sufficient quantitative data so that many of these conclusions must now be considered quite well established.

Two aspects of the report should be noted. First, as the report of a committee it represents only a majority opinion on many significant items; this can at the same time be considered a strength and a weakness of the report. Next, the report does not deal explicitly with the problem of specifying "the technical principles which should be applied in television channel allocation."

---

[2] See attached Dissenting Statement of Commissioner Bartley.
See attached Statement of Commissioner Ford.

We supposed that this was the fundamental purpose of the FCC in establishing this organization. This letter has as its object the statement of cerain reservations to the TASO report held by those of us at CRPL who have been associated with this work, together with a summary of objective technical principles for developing an allocation of television channels designed to serve the public interest, convenience, and necessity.

We have three primary reservations to the conclusions reached in the TASO report: (1) TASO gives methods for defining the service area of a television station. We cannot understand these definitions, and believe that their adoption will lead to great confusion in applications.

(2) TASO claims to have developed a useful prediction method. Our reservation relative to this claim arises from the fact that the only test of their method of which we are aware is a study of the correlation between the observed and predicted field strength variations without regard to absolute values. The many sad experiences we have had with this method of testing a prediction formula force us to await a study of the absolute deviation of the observed from the predicted values before validating this proposed method.

(3) TASO concluded that the CRPL transmission loss prediction formula for specific terrain conditions does not increase the accuracy of prediction relative to our universal curves enough to justify the extra labor involved in its use. We disagree with this conclusion for two reasons (*a*) we have shown that the universal curves drawn through data are substantially biased by the fact that "good" rather than "typical" receiving sites have usually been chosen for past transmission loss recordings (this point was elaborated in a letter to Mr. E. W. Allen, dated December 8, 1958, in which it was shown that this bias could change the required separation between stations by as much as 68 miles), and (*b*) we have shown a substantial reduction in both the root mean square deviation and the range of the observed values relative to the values predicted by our formula compared to the root mean square deviation and the range of the observed values relative to the universal curves.

All of the above reservations deal with technical details, as does most of the TASO report, but it is in the proper understanding of technical principles of allocation rather than in such details that the most progress will be made in improving the present television allocation structure.

The following comments represent the opinion of the writers, but this opinion is based on an objective analysis of the allocation problem which is contained in reference E to the FCC 1949 ad hoc committee report and in an addendum to reference E which was written in November 1950 as a result of the hearings which led ultimately to the adoption by the Commission of its sixth report and order on April 11, 1952. In that addendum it was suggested that the FCC should attempt to maximize the service area per channel rather than maximize the service area per station. With a scarcity of suitable channels with similar propagation characteristics, and a desire for a large number of competing services, it seemed quite clear then and it still seems to us now that maximizing service area per channel is the correct procedure to adopt. In the abovementioned addendum it was suggested that maximizing service area per channel requires the use of high power, high transmitting antennas and, in some cases, directional transmitting antennas. It was further shown that very close spacings between stations are feasible when one desires to maximize the service area per channel; in fact, using the ad hoc committee assumptions and the propagation data then available, the conclusion was reached that cochannel stations could be spaced efficiently as little as 110 miles apart and adjacent channel stations as little as 40 miles apart.

The FCC now has rules (1) limiting the maximum power, (2) limiting the maximum antenna height, and (3) requiring spacings between cochannel stations greater than 170 miles. It seems to us that the preceding three rules were developed by the FCC in an effort to minimize the interference between stations rather than to maximize the service area per channl, and this appears to be a wasteful—although perhaps administratively convenient—practice which we feel cannot much longer be afforded in this country where the demand for other legitimate and important uses of the spectrum is so great.

We believe that the trouble the FCC has been having in the allocation of television channels arises from its desire to satisfy everyone and a tendency to lean too heavily on the advice of the industry engineers who obviously have their own selfish interests to protect. Thus we believe it may not necessarily be true

that an allocation designed to serve the best interests of the individual television stations will at the same time best serve the public. When stations are allocated with wide separations between them the service area per station will be maximized thus pleasing the present station owners. However, these wide separations clearly preclude the establishment of many stations on each channel and actually provide less area per channel than could be provided with closer separations. Thus the wide separations provide less area and fewer stations per channel. We believe the television industry induced you to use wide separations by capitalizing on your desire to protect the rural televiewers who will, the industry argues, naturally lose service when the spacings are shorter. This is certainly a fallacious argument. It is true that rural areas will always receive poorer television service simply because television stations are located in metropolitan areas. The only way to correct this situation would be to locate the stations in rural areas, but then you would often (although not always) be discriminating against the more populous metropolitan areas. So we see that metropolitan areas will always receive more television service than rural areas, simply because there are more people living in the metropolitan areas and it is, after all, only people who will use the service. If you maximize both area and number of stations per channel, you cannot be expected to go further in providing an efficient television service.

But, you may say, we cannot now reduce the spacings between stations since this will create interference for many televiewers residing between the stations. Admittedly this is a difficult matter, but again the answer appears to be that you can't satisfy everyone—only the majority, and the majority of the people, by definition, reside in metropolitan areas. Note that these rural televiewers between the more closely spaced stations may, in many cases, use directional antennas and thus still receive a satisfactory service.

In order to avoid facing the above difficult decisions, it has been suggested that it is only necessary to move all of the stations to the UHF. In this way, it is argued, there are enough channels available so that it would be possible to keep the stations sufficiently far apart so as to avoid annoying interference problems and yet have enough stations so that every community can be provided with several programs. Aside from the tremendous cost to the public of such a move in terms of obsolescence of their present receivers, the broadcasters costs would also be tremendously greater for each televiewer served, and thus this plan is probably economically unsound. Finally, even if it were economically feasible, this also must be considered to be at best only an interim solution, since the demands for the spectrum will always increase in the future and it will never more be possible in the United States to afford the inefficiency in channel usage implied by the use of wide spacings between television stations.

It was pointed out in reference E to the ad hoc committee report that relatively wide spacings are required between stations in an idealized triangular lattice in order to maximize the area per channel. However, it was also evident from the analysis in that report that the area per channel was not critically dependent on the exact spacing used. For example, with 100 kw. stations operating on 63 mc., the grade C service area per channel is decreased by only 6.5 percent in changing the required spacing from 170 miles to 120 miles, and this change would actually double the potential number of stations on the channel. Furthermore, the analysis in the addendum to reference E indicated that the optimum separation for actual stations (which are not in such an idealized triangular lattice) would be systematically smaller and that the optimum separation for isolated pairs of stations is the smallest of all.

Aside from pointing up the great possibilities of using closer spacings for a more efficient allocation, the above analyses clearly show that the maintenance of a precise minimum spacing between stations cannot be justified on any other grounds than administrative convenience. It should be noted that the actual optimum spacings between stations for maximizing the coverage area per channel will be far different from the idealized maxima determined from any universal propagation curves. For example, as has been well established by the TASO studies, there are often wide divergences in propagation characteristics in the several directions from a given station and for stations in differing geographical locations, and these differences are, according to TASO, not predictable except at great expense and effort. Fortunately, since the service area covered per channel is not critically dependent on the spacings between the stations, this difficulty of making precise propagation predictions is not critically important to the FCC. Except possibly for some particularly unusual assign-

ment problems, the FCC could largely ignore these propagation differences and simply adopt a reasonably small minimum spacing (e.g., 100 miles) between high power cochannel stations as a basis for a technically efficient and yet administratively convenient method of allocation. Even closer spacings than 100 miles might sometimes be justified.

Although it is desirable to encourage the use of high power and especially to encourage the use of high transmitting antennas, it is not at all necessary that the power used on a given channel be the same for all stations. We believe that the use of low power VHF translators and boosters should be encouraged and this will make possible the extension of coverage to many small communities where more elaborate installations are not economically feasible. If the FCC were to adopt this technically sound policy, we foresee that many thousands of such low power VHF translators and boosters would spring up all over the country, but especially in the less populous regions. Note that the minimum separation for the efficient coverage of area between low power stations or between a low power station and a neighboring high power station is systematically smaller than for two high power stations, and thus the 100 mile minimum rule might well be relaxed in such cases. The economic advantages to the public of using VHF rather than UHF translators is obvious.

We believe there is a good chance that all of the really important and economically feasible television requirements of this country can be accommodated on the present 12 VHF channels by permitting closer spacings between the stations. This will lead to an actually greater coverage of area per channel, and to a very large number of additional stations. If, after such a reallocation has been made, still further facilities are considered to be really necessary, it would appear to be prudent to add a few channels near, or within, the present VHF band so as to accommodate these additional stations. In this way the modification of the receivers presently in the hands of the public would involve a minimum of expense.

In any case, now that the factual TASO studies are available, it does appear that the present UHF band should be formally abandoned for television use.

A further study of the allocation problem is currently underway in this laboratory, and the results of this study will be forwarded to you when they are completed. It is expected that the conclusions reached will be substantially the same as those reached in our earlier studies. We are enclosing herewith a copy of the addendum to reference E and a recent report which discusses the allocations problem in general terms; see particularly section 8.

Sincerely yours,

K. A. NORTON,
Chief, Radio Propagation Engineering Division,
J. W. HERBSTREIT,
Assistant Chief, Radio Propagation Engineering Division,
P. L. RICE,
Chief, Tropospheric Analysis Section,
Radio Propagation Engineering Division,
R. S. KIRBY,
Chief, Propagation Research and Applications Section,
Radio Propagation Engineering Division,
Central Radio Propagation Laboratory.

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., April 10, 1959.

Interoffice memorandum.

For: Information.

To: The Commission (Limited distribution).

From: Acting Chief Engineer.

Subject: Comments of Mr. E. W. Allen on the Norton letter of March 27, 1959, including previous correspondence of Mr. Allen and Mr. Boese with Mr. Norton on VHF propagation and television assignment planning.

A copy of Mr. Kenneth Norton's letter to the Chairman was immediately forwarded to Mr. Allen in Los Angeles, where he is attending the C.C.I.R. General Assembly. While there was not time to coordinate staff comments with Mr. Allen prior to the Commission meeting of April 2, a memorandum was received from Mr. Allen dated April 5, 1959, which is generally consistent with

the discussion. A copy of the memo is attached as appendix A. The memo refers to previous exchange of letters between Mr. Allen and Mr. Norton dated December 8, 1958, and December 12, 1958 (appendix B and appendix C respectively). It should be noted that Mr. Norton's letter dated December 8, 1958, was introduced at a briefing of IRAC representatives at Boulder prior to its receipt by Mr. Allen.

Inasmuch as Mr. Norton's letter to the chairman represents amplification of comments contained in the Fourth Annual Report of the Boulder Laboratories of the National Bureau of Standards, it is considered pertinent to include an exchange of correspondence between Mr. Norton and Mr. Boese on the same general subject. These letters are included in appendix D and appendix E respectively. This section of the National Bureau of Standards Boulder Annual Report was referred to in the April 3 issue of Broadcasting magazine. This exchange of correspondence was occasioned by the comments in the report and discussion at the Interdepartmental Council on Radio Propagation and Standards held at Boulder, Colo., November 6, 1958. While not on the agenda of the meeting, this matter was discussed at length by Mr. Norton. While Mr. Boese was not prepared on the technical details, he pointed out that television assignment policy was a matter for Commission decision, considering other than technical factors and not susceptible of a purely mathematical approach and urged the C.R.P.L. to contribute fully to the work at TASO on scientific matters within the cognizance of the Bureau of Standards. It should be noted that Mr. Boese did not reply to Mr. Norton's letter because it was considered unfruitful to continue the argument For example, Mr. Norton belabored the point that the ad hoc committee did not consider the actual problem of television assignment engineering. It is well known that Mr. Allen as Chairman of the ad hoc committee considered reference E and the addendum thereto as being beyond the Commission's terms of reference for the ad hoc committee.

A footnote has been added by the staff to Mr. Allen's memo (appendix A) to clarify his discussion in accordance with studies made by the Technical Research Division which may not have been available to Mr. Allen in Los Angeles. On the propagation curves attached to Mr. Norton's letter of December 8, 1959, to Mr. Allen, data points from the TASO investigation have been inserted which support the reasonableness of the ad hoc curves used for the sixth report and T.R.R. No. 2.4.16 dated October 22, 1956, "Propagation Data and Service Calculation Procedures Used for the Rescinded Appendix 'A' of Report and Order (Docket 11532) Released June 26, 1956." Incidentally, the scatter of the data points in the second figure shows the wide variation of data points and illustrates the difficulty of drawing single value curves.

The CCIR curves which Mr. Norton challenges as not being representative of typical receiving locations include a great deal of European data which are still subject to discussion in the CCIR study group. While it is admitted in Mr. Allen's letter (appendix C) that more needs to be learned about the influence of terrain on interfering field strengths, it is believed that propagation curves supplied to the Broadcast Bureau fairly represent the best estimates of service and interference which can be derived from the available data in a form suitable for practical engineering use.

RALPH J. RENTON,
Acting Chief Engineer.

APPENDIX A

HOTEL BILTMORE,
Los Angeles, Calif., April 5, 1959.

Memorandum to Mr. Ralph J. Renton.

1. This is in connection with the letter dated March 27, 1959, to the chairman from Messrs. Norton, Herbstreit, Rice, and Kirby on the subject of TASO and the television allocations problems. The TASO terms of reference, as approved by its board of directors, should make it clear that it was organized as a factfinding body rather than as an allocations policy study organization. The decision of TASO to stick to factfinding and not to make policy recommendations was supported by the FCC staff in meetings and by correspondence of record in the TASO proceedings.

2. As to the definitions of service and graphical presentation of service with which they disagree, this is a part of a running argument with Norton which started in the ad hoc committee and has been carried on in various aspects and

in various forums since that time. Neither we nor the other participants in TASO have been able to convince him that a service integral would not satisfy all of the need for knowledge of the extent of service and of the areas within which service would be provided. Having lost the argument in TASO, the authors are now carrying it directly to the Commission. It is quite likely that the Commission's present inquiry will lead to formal proceedings on television spectrum allocations either in Docket 11997 or in a separate docket related to that one. The solution appears to lie in associating the letter with the docket and allowing the authors to appear in the formal proceedings, where their proposition can be subjected to the light of day and be tested by cross examination.

3. The arguments set forth in support of the CRPL transmission loss formula on page 2, paragraph (3) are in my opinion largely spurious when applied to the problem of deciding how many channels are required to provide a single service on an area basis and assist in determining the total number of channels required for a satisfactory allocation to television. If a location bias exists, it may be corrected by proper modification of the universal or average curves and such correction does not require the use of the transmission loss formula. However, this charge was made once before in a letter dated December 8, 1958, from Norton to me which was circulated prior to its receipt by me to a meeting of IRAC representatives at Boulder for the purpose of briefing them on the implications of propagation research on frequency allocations. I replied to the comments in a letter dated December 12, 1958, pointing out that the FCC station spacings were not based on the curves which Norton claimed to have the location bias. The data furnished by Norton fitted the ad hoc curves used by the FCC very well indeed. Norton has never replied to my letter defending the use of the ad hoc curves and in the present letter ignores the explanation given by me.

4. The authors place reliance on reference E to the report of the ad hoc committee. Since I was chairman of the committee, I am generally familiar with what is contained in the report. It is my recollection that failure of the committee to adopt all of the ideas expressed in this and some other references prepared by CRPL was the basis for a dissenting statement by Norton attached to the report. I do not have a copy of the report with me and cannot make a detailed analysis or rebuttal, but I believe that an examination of the facts included in the letter will reveal that they do not necessarily support the conclusions. In the last paragraph on page 2, the authors espouse the principle of maximizing the service area per channel. However, in the last full paragraph on page 4, it is admitted that reducing the spacing from 170 to 120 miles reduces the service area per channel by 6 percent. Even though the number of stations could then theoretically be doubled, the grade C service area per channel appears to be reduced to 94 percent and the service area per station to 47 percent of its former value. These studies ignore the results which have been found in actual assignment studies made by the Broadcast Bureau, that the location of cities is such as to prevent the realization of the increases in the number of stations indicated by theoretical studies which ignore the discrete placement of cities.

5. The statement in the first full paragraph on page 3 is not correct. To the best of my recollection, powers and antenna heights were not limited to prevent mutual interference between stations but to tend to equalize service and competition between stations operating on different channels in the same area. The FCC staff has repeatedly told the Commission and I believe that formal hearing exhibits show that increases in both power and antenna height at present station spacings would improve the technical quality of the service. The authors completely ignore the very practical and sometimes controlling factor of equalizing competition, the failure of which has to a large extent been responsible for many of the difficulties of UHF.

6. The arguments from the bottom of page 3 to the top of page 5 are in essence a disagreement with the Commission's philosophy of allocation. They urge a greater concentration of stations in the heavily populated areas at the expense of the rural and smaller communities. Certainly this can be done if the Commission desires to do so, and is willing to pay the cost in terms of loss of service to the rural areas and to interlying communities which are too small to support stations of their own. Only a detailed assignment plan embodying the proposed principles and employing the latest data at our command will show the areas of service gained and lost. The generalized studies of reference E and more

recent studies with reasonable amounts of receiving antenna directivity show channel efficiencies of 25 to 35 percent.*

This means that three or four channels are required to cover all areas with one service even with the use of high station powers, high antennas, and reasonably uniform geographical arrangements of station assignments. This indicates that the 12 VHF channels can provide an equitable distribution of about three or four services. If more than these are assigned to the heavily populated areas, it will be at the expense of service in the more sparsely populated areas. The use of directional transmitting antennas and boosters will not raise the channel efficiency above the given values, but can only tend to compensate for a nonuniform assignment pattern and help to raise the channel efficiency toward the above level. The Commission has been advised of these limitations on several occasions by the staff, and they have been borne out both by idealized studies using overlays and by the various studies involving assignments to specific cities which have been made by the staff. The authors have suggested the use of directional receiving antennas at rural receiving sites, but the directivity of practicable receiving antennas is limited and to the extent considered practical has been included in the studies mentioned above.

7. The Commission has consistently rejected any plan which provides three or four services on a broad area basis and which provides no room for expansion in terms of local outlets where economic support exists and for the needs of educational institutions. Staff studies have shown that because of the nonuniformity in the spacing of cities, drastic reductions below the suggested 100 or 120 mile spacings are necessary to provide even token assignments to some of these cities. At spacings of 100 miles and below, the area served per channel falls rather drastically below the optimum value of about 190 miles for cochannel stations using nominal carrier offset (10 kc.), and which may be about 150 miles if precision offset proves to be generally practical. Thus, in my opinion, the conclusion of the authors that the 12 VHF channels are sufficient to accommodate all of the important and economically feasible television requirements is not borne out by the generalized statements made in the letter or by studies made by the staff, unless the Commission is willing to accept an allocation which will provide three or four services on a relatively uniform area basis, or what appears to be the authors' apparent definition of a satisfactory allocation, a concentration of service in the populated areas at the expense of service in areas of lesser population.

8. The general tenor of the letter is the arrogation by the authors of the Commission's prerogative of determining the desirable number of services in a city and the nature of an equitable distribution of assignments. Insofar as I am aware, the authors are not trained in this field and should not be presumed to have any particular competence therein.

/s/ E. W. ALLEN.

APPENDIX B

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
BOULDER LABORATORIES,
Boulder, Colo., December 8, 1958.

Cryogenic Engineering Laboratory.
Central Radio Propagation Laboratory.
Radio Standards Laboratory.

Mr. E. W. ALLEN,
Chief Engineer, Federal Communications Commission,
Washington, D.C.

DEAR ED: I understand from Bill Boese that you wanted some more background information on my statement relative to television allocations on page 128 of the Fourth Summary Report of the Boulder Laboratories for the year ending June 30, 1958.

The Ohio mobile data are, as you know, not mobile data at all, but actually are long-term recordings made by Carl E. Smith and James Hill under contract

---

*Editorial note: The generalized studies of reference E indicated efficiencies on the order of 15 percent. A more detailed Commission staff study using parameters deemed more appropriate such as more recent data on adjacent channel selectivity and a 6-decibel receiving antenna gain in the direction of the desired station was subsequently made and indicated efficiencies on the order of 25 to 35 percent.

to CRPL on two FM broadcast stations in Ohio over a period of 2 years at 40 randomly selected receiving locations. The 40 receiving sites were chosen without regard to the usual criteria used in selecting receiving sites for long-term recordings; namely, in open, relatively flat, terrain with no nearby trees or overhead wires, but were chosen instead as nearly as possible on a preset lattice with separations between locations large enough to make the correlation of the received fields for adjacent receiving points negligible. This insured randomness with respect to terrain effects and efficiency in the recording program. Some compromise with the grid was naturally necessary in order to find sites at which power would be available and for which the property owner's access rights were available. The recordings were made over a 2-year period from July 3, 1951, to June 30, 1953, and represent all-day all-year conditions. The recordings were made in mobile laboratories which were moved frequently from one site to the next in order to obtain a good sampling of the seasonal and diurnal effects at each of the 40 receiving locations. A sufficient number of hours of recording were available so that fields representative of the highest 1 percent of the hours could be determined for each path without extrapolation. However, the recording pen went off scale some of the time and, as indicated in the accompanying table, the $E(1)$ values were thus greater on a few of the paths than their recorded values. Thus the true mean 1 percent values are also greater than the tabulated values: $E(1)+10 \log_{10}d$. In order to obtain a measure of this possible bias, we have also listed the medians of the 20 values of $\{E(1)+10 \log_{10}d\}$; since these medians are not consistently much larger than the means, it appears that this bias is essentially negligible. Also listed in the table are the 12 estimates of the variance s^2_x of the 20 values of $E(X)+10 \log_{10}d$ and the wings on the plotted points represent plus and minus their standard errors.

The receiving antennas used were always 30 feet above the local terrain while the transmitting antenna effective heights were obtained by finding the height of the transmitting antenna relative to a parabolic curve fit to the central 0.8 of the terrain between the transmitting antenna and its standard atmosphere (4/3 earth radius) horizon.

In order to allow for the effects of antenna height, we assumed that $E(X)+10 \log_{10}d$ is a function of

$$d_s=d-\sqrt{2h_{te}}-\sqrt{2h_{re}}.$$

Thus, since

$$\sqrt{2h_{te}}+\sqrt{2h_{re}}=39.4 \text{ miles when } h_{te}=500' \text{ and } h_{re}=30',$$

we plotted

$$E(50, X)=E(X)+10 \log_{10}d-10 \log_{10}(d_s+39.4) \text{ at } d=d_s+39.4$$

for each station as measured at each distance range and for $X=1$ percent, 10 percent, and 50 percent.

The solid curves shown on the attached figure are the FCC 1949 ad hoc committee curves, while the dashed curves are the C.C.I.R. values tentatively adopted at Geneva in Document V/3–E (2d revision) August 2, 1958. I believe that the C.C.I.R. curves represent the best presently available estimates of $E(50, X)$ versus distance. But it is important to notice that data plotted as a function of distance have an extremely large variance with respect to curves of this kind, and that the resulting $E(50, X)$ curve for any given value of X is at best only the median of the particular sample of terrain paths over which the measurements were made. Thus the FCC ad hoc 1949 curves went through the data available in 1949 just as the C.C.I.R. curves go through the larger, but not necessarily more representative, sample of the data available at the time of their preparation.

Also enclosed with this letter is a graph showing $(E50, 50)+10 \log_{10}d$ data obtained on more than 600 paths and plotted as a function of d_s. These data cover a wide range of frequencies, antenna heights and terrain conditions. However, since it is known that frequency does not have a large influence on the propagation in this distance range, and since most of the paths correspond to frequencies between 50 and 200 mc., most of the variance of the data shown on the graph must be attributed to terrain effects including the variance associated with the fact that rather arbitrary methods were used for determining the heights h_{te} and h_{re} above the terrain.

Using the methods of N.B.S. Report No. 5582, "Predictions of the Cumulative Distribution With Time and Ground Wave and Tropospheric Wave Transmission Loss," by P. L. Rice, A. G. Longley, and K. A. Norton, we have prepared

theoretical smooth earth curves in the form E(50, 50+10 $\log_{10}$ d versus d_s) and, interestingly enough, they lie very nearly in the middle of the mass plot of data for the 600 paths. We conclude from this that irregularities in the terrain are just about as likely to increase the expected field as to decrease it, at least in the frequency range in the neighborhood of 100 mc. and for carefully selected receiving sites; there is some evidence, however, at higher frequencies that the median effect of the terrain is a decrease in the received field. The explanation for this lies in the phenomenon of obstacle gain and a theory of obstacle gain for moderate roughness is given in the paper "The Use of Angular Distance in Estimating Transmission Loss and Fading Range for Propagation Through a Turbulent Atmosphere Over Irregular Terrain," by K. A. Norton, P. L. Rice, and L. E. Vogler, as published in the October 1955 issue of the Proc. I.R.E.; see especially figures 20 and 21 and the accompanying discussion.

Returning to the Ohio mobile data, it is evident on the graph that they lie well below the C.C.I.R. curves. I believe that the probable cause of this bias is not that there is anything unusual about the Ohio terrain, since it would, as you know, probably be characterized as representing approximately a median roughness relative to the degrees of roughness which might be encountered in the United States or, for that matter, throughout the world. Rather, I believe that the C.C.I.R. curves, and, in fact, any curves we may be able to derive from currently available data, are not representative of the median terrain conditions to be expected in broadcast transmissions, since most of the presently available data were obtained at receiving sites carefully chosen in such a way as to yield as nearly as possible smooth earth conditions so that they might be expected to fit a smooth earth theory.

Note that this bias of carefully selected sites versus randomly selected sites is quite large and implies that the required station separation as judged by the C.C.I.R. curves would be very much greater than that based on the Ohio mobile data. The following table shows this additional distance at the three values of X equals 1 percent, 10 percent, and 50 percent for all four sets of paths.

Table of site selection bias, d, in statute miles

X	WCOL, 78 miles	WHKC, 84 miles	WCOL, 116 miles	WHKC, 122 miles
1 percent	62.5	68	46.0	45.0
10 percent	56.5	58	38.5	44.5
50 percent	46.5	58	26.5	40.0

The bias relative to the FCC 1949 ad hoc curves is very much less but, of course, these curves were based on a very much smaller sample of data and thus do not constitute as good a reference value for this bias.

We are, as you know, preparing a new set of empirical curves, using d_s as a parameter, to replace the CCIR curves. However, the principal advantage of these new curves will be the fact that they are based on a larger sample of data. They will still be characteristic only of the particular sample of data available and will not represent any particular degree of terrain roughness. Furthermore, they will be biased by the fact that the receiving locations in most cases were carefully selected rather than being chosen at random.

Faced with facts of this kind, what is the radio engineer charged with developing an efficient allocation scheme to do? It appears to me that there are only two alternatives to follow and, at the present time, only the first of these has been developed to the point where it may actually be used:

(1) By using some approximate curves characterizing mean terrain conditions such as those of the CCIR or the revised curves which we are now preparing, with some arbitrary allowance for the bias likely to be present in such curves, a tentative allocation of stations may be made. Next, a determination may be made of the feasibility of each station pair in the proposed allocation by testing it for mutual interference at a selected set of receiving locations suitably chosen within the service areas of the proposed stations by an efficient

statistical sampling scheme. This testing may be accomplished by determining the terrain profiles to both the desired and undesired stations from each of these randomly chosen receiving locations and then calculating the two cumulative distributions with time of the transmission losses, corresponding to the desired and undesired transmission paths. Using these distributions of transmission loss, it is easy to obtain the expected distribution of the ratio of desired-to-undesired signals at the terminals of the receiving antenna. Suitable methods for making such calculations are given in NBS Report No. 5582, mentioned earlier. The use of these methods will automatically provide allowance for (a) the effects on the expected median field of the actual terrain in the area under consideration, (b) the expected distribution with time of the fields from both the desired and undesired station, (c) the effects on these time distributions of the particular terrain in the area under consideration, (d) climatological effects in different parts of the country, and (e) the correlation of the desired and undesired fields with changes in the receiving location. From such an analysis a determination can be made of the percentage (of those receiving locations which are expected to receive a satisfactory service from the desired station) which are expected to be interfered with by the undesired station. From such studies the actual feasibility of the tentative allocations can be established with proper allowance for the particular terrain characteristics in the area under consideration.

(2) We may someday be able to develop methods of characterizing the electromagnetic nature of a particular terrain so that a particular area of the country can be classified as to its effective terrain roughness in terms of one or more statistical parameters in much the same way as the conductivity and dielectric constant may be used for characterizing the properties of the terrain important in surface wave propagation. Work is currently underway at CRPL leading toward the development of methods which will yield in terms of these terrain parameters the distribution of transmission loss with receiving location as well as with time, but it seems likely that it will be several years before such statistical methods will be available in a useful form. Furthermore, even then the use of such methods will likely be fraught with much the same difficulties currently encountered with the use of ground conductivity maps; namely, the difficulty of assigning a single value to characterize an entire propagation path.

Unfortunately, radio propagation over irregular terrain is not a simple problem and, unless you are willing to accept the large errors implied by the large scatter of data on the attached graphs, I am afraid that we have nothing better to offer at present than NBS Report No. 5582.

Sincerely,

KENNETH A. NORTON,
Chief, Radio Propagation Engineering Division.

Ohio mobile data

[Polarization: Horizontal; Receiving Antenna Heights: h_{re}=30 feet]

Station	WCOL	WHKC	WCOL	WHKC
Frequency (*Mc/s*)	92.3	98.7	92.3	98.7
Number of paths	20	20	20	20
Distance range (statute miles)	76.0–86.7	80.9–88.9	117.7–123.3	119.3–125.7
Height range of h_{te} (feet)	318–520	619–820	382–547	728–821
Range in hours of observation	87–125	66–186	149–291	120–310
$\overline{d_s}$(Statute miles)	44.32	38.63	83.06	76.61
Range of d_s(statute miles)	40.8–48.1	33.4–42.3	77.4–85.3	71.6–79.3
$\overline{E(50)+10 \log_{10}d}$ (*db*)	22.3±1.0	26.0±1.0	20.0±0.7	23.6±0.6
$\overline{E(10)+10 \log_{10}d}$ (*db*)	33.7±1.4	35.6±1.1	29.0±0.8	31.8±0.8
$\overline{E(1)+10 \log_{10}d}$ (*db*)	>41.6±1.2	>45.2±1.4	>38.5±1.4	>40.0±1.4
Number of paths with an uncertain $E(1)$	5	4	4	2
Median of $[E(1)+10 \log_{10}d]$ (*db*)	42.3	45.75	37.1	37.5
s^2_{50} in db^2	20.08	19.78	8.37	6.49
s^2_{10} in db^2	36.98	25.80	11.32	11.43
s^2_1 in db^2	29.93	40.37	36.41	36.79

APPENDIX C

DECEMBER 12, 1958.

Mr. KENNETH A. NORTON,
Chief, Radio Propagation Engineering Division,
Boulder Laboratories, National Bureau of Standards,
Boulder, Colo.

DEAR KEN: Thank you for your letter of December 8, dealing with the matter of location bias in the measurement of tropospheric fields, and your reference to its effect on television station assignments in the fourth summary report of the Boulder Laboratories for the year ending June 30, 1958.

Both of us have, of course, suspected for some time that there was a systematic bias in these measurements by reason of the selection of clear sites for this purpose. It is my recollection that there was some concern on this score in the ad hoc committee, but we had no direct evidence of it. You will recall that we did study the location distribution of several sites for which data were taken over approximately the same path and that the distribution was about the same as for sector medians of mobile measurements. This did not resolve the problem but it was the best we could do with the data at hand. Subsequently, the FCC made a mobile survey about the Laurel recording site, using a Baltimore station as the signal source, but the results did not show a measurable bias. Like yourself, I am not yet satisfied that a systematic bias does not exist. If it does, it should be evaluated so that we can label the curves as E(50, X,) with some assurance.

Regarding the statement in the report, I think that it deserves comment in two respects. First, as a matter of policy, I do not think that the laboratories should publish a comment as to the merits of an action taken by another agency, even if a thorough and comprehensive study has indicated that the action was technically unsound. To me the proper procedure would be to call the facts to the attention of the agency and give it the opportunity to make such announcements about its prior action and to take such corrective action as appeared to it to be proper under the circumstances. As to the technical merits, the facts in the instant case do not appear to me to support the comment. In the first place, the sample of data is relatively small and was taken in one area. In the second place, the disparity seems to occur between the sample and the CCIR curves. The E(50, 10) ad hoc curve, on which the Commission relied in part in arriving at its station assignment rules seems to agree with the data very well.

We have always known that the CCIR curves were higher than the FCC (ad hoc) curves. I participated in the preparation of the original CCIR curves in the Stockholm meeting of study group V in 1952, and they were made higher to correspond to the experience in Europe, where they are mainly used. They have no effect on the U.S. TV assignment plan, unless Canada and Mexico use them as a partial justification for the wider separation between their stations and ours.

Concerning the last point raised in your letter, I quite agree that our present prediction methods are inadequate for specific cases and when so used may lead to large errors. I had hoped that the TASO studies would produce a method which would yield more reliable results for specific conditions of terrain and climate. Although it appears that we shall have to wait a while longer to develop a method, I believe that the work of TASO has helped to awaken interest in the matter as well as to produce some effort on the specific problem and may lead to an earlier solution than might otherwise have been the case.

Very truly yours,

E. W. ALLEN, *Chief Engineer.*

APPENDIX D

DECEMBER 9, 1958.

Mr. KENNETH A. NORTON,
Boulder Laboratories,
National Bureau of Standards,
Boulder, Colo.

DEAR KENNETH: At the last meeting of the Interdepartmental Council on Radio Propagation on November 6, 1958, you read to the membership the following paragraph from the Fourth Summary Report of the Boulder Laboratories:

"During our analysis of the tropospheric forward scatter data, we discovered that the earlier data on which the FCC based its allocation of television stations was biased by the way in which the data were obtained. Thus, these data were obtained at receiving sites in open terrain, especially selected to be representative of a smooth earth. When data obtained in a series of randomly chosen sites in Ohio, which are more nearly representative of typical locations actually used for television reception, were analyzed, it was found that the received fields were about 15 db weaker on the average than for the specially selected sites. We conclude from this that, even using the same standards previously adopted by the FCC for television allocations, the stations could, on the basis of this evidence, be placed about 25 miles nearer to each other. Since the standards previously adopted were, in the opinion of this observer, already much too high, it might now be considered feasible to solve most, if not all, of the television allocation problems, simply by permitting the VHF stations to be more closely spaced."

I was unprepared to answer the above allegations in detail since this question was not on the agenda, but indicated that the present television assignment plan was based on the best judgment by the ad hoc committee on which CRPL was well represented. These curves are distinctly different from the curves developed by the ad hoc committee on which the present television spacings were derived. Figure 15 of reference D to the ad hoc report tends to show that the standard deviation of the distribution of the signals at the Commission's monitoring stations corresponds with that for the distribution of the mobile measurements over various types of terrain both with respect to the ad hoc curves. I indicated that the Commission would be receptive to information which would lead to a greater accuracy interference of service and estimation. I was not aware at that time that the analysis referred to in the progress report had not been formally reported upon. I have been told that the matter was mentioned informally at one of the TASO Panel IV meetings.

Mr. Harry Fine visited you recently to determine the details of the analysis on which this paragraph was based.

First, it was learned that the data obtained at the randomly chosen sites in Ohio were compared, to obtain the 15 db differential, with curves submitted by CRPL in 1957 to the CCIR in document V/3E. These generalized propagation curves do not represent the consensus of experts in this field including those participating in the CCIR Study Group V.

Second, the comparison of the Ohio measurements was made at a distance of 85 miles. It would have been more appropriate for interference determination to compare the measurements at 125 miles since this is more nearly the cochannel interference distance.

Third, the level of the signal normally used for calculation of interference is the 10 percent level rather than the median on which your comparision was based.

When the comparison is made of the 10-percent, 125-mile data with the ad hoc curves, it is found that the ad hoc curves are only 1 db higher than the Ohio data. While it is true that a revision of the ad hoc curves is indicated by the data which has since become available, it is likely that the difference will be much less than 15 db.

It is pertinent to note that in the Ohio measurements at each distance range, measurements were made at 20 locations for about 2 weeks per location. This is a relatively small amount of data taken in one small geographic area on which to challenge the validity of an assignment plan. Furthermore, the difference between the field strengths at 85 miles and 125 miles is much smaller than that indicated by the distance attenuation in any of the more recent average propagation curves which have been developed. This leads to a question of whether these measurements are typical.

It would appear the conclusion in the last sentence does not follow from the data you have reported. Furthermore, in addition to being inaccurate, the references to the FCC and its actions are out of place in a progress report. This seems to be the type for which the collective judgment of a group, such as one of the TASO panel, would be helpful.

I am sending a copy of this letter to Mr. Coates and Mr. Dickson for their files in order to keep the record straight.

Very truly yours,

WM. C. BOESE.

APPENDIX E

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
BOULDER LABORATORIES,
Boulder, Colo., December 15, 1958.

Cryogenic Engineering Laboratory.
Central Radio Propagation Laboratory.
Radio Standards Laboratory.

Mr. WILLIAM C. BOESE,
Federal Communications Commission,
Washington, D.C.

DEAR MR. BOESE: This is in reply to your letter of December 9, 1958. I believe that my letter to Mr. Allen dated December 8, 1958, which evidently crossed yours in the mails, will clarify the matter under consideration. However, to keep the record straight I believe a further discussion of your letter is desirable.

In your second paragraph you state that the FCC television allocation plan "was based on the best judgment of the ad hoc committee." This is certainly not so since the ad hoc committee never considered how its field strength curves were to be used for allocation. Such considerations are presented in the addendum which I prepared to reference E of the ad hoc committee report. This addendum was never discussed by the ad hoc committee since the chairman never called a meeting for that purpose, although I urged him to do so. In that addendum I pointed out that the FCC should attempt to maximize the service area per channel rather than maximize the service area per station. With a scarcity of channels and a desire for a large number of competing services, it seemed quite clear to me then and it still seems to me now that maximizing service area per channel is the correct procedure to adopt. In the above-mentioned addendum I pointed out that maximizing service area per channel requires the use of high power, high transmitting antennas, and directional transmitting antennas. I further pointed out that very close spacings between stations are feasible when one desires to maximize the service area per channel; in fact, using the propagation data then available, I concluded that cochannel stations could be spaced efficiently as little as 110 miles apart and adjacent channel stations as little as 40 miles apart. The FCC now has rules (1) limiting the maximum power, (2) limiting the maximum antenna height, and (3) requiring spacings between cochannel stations greater than 170 miles. Since these rules are diametrically opposed to the conclusions I suggested in the addendum to reference E, I cannot agree that the FCC allocation was based on my best judgment and, so far as I know, the other members of the ad hoc committee expressed no opinion.

In the second paragraph on page 2 of your letter you state: "These generalized (CCIR) propagation curves do not represent the consensus of experts in this field, including those participating in the CCIR Study Group V." On the contrary, these curves were adopted by Study Group V at Geneva this past summer. As I pointed out in my letter to Mr. Allen, I do not believe that any curves through currently available data should be used for allocation purposes, because of the site selection bias involved.

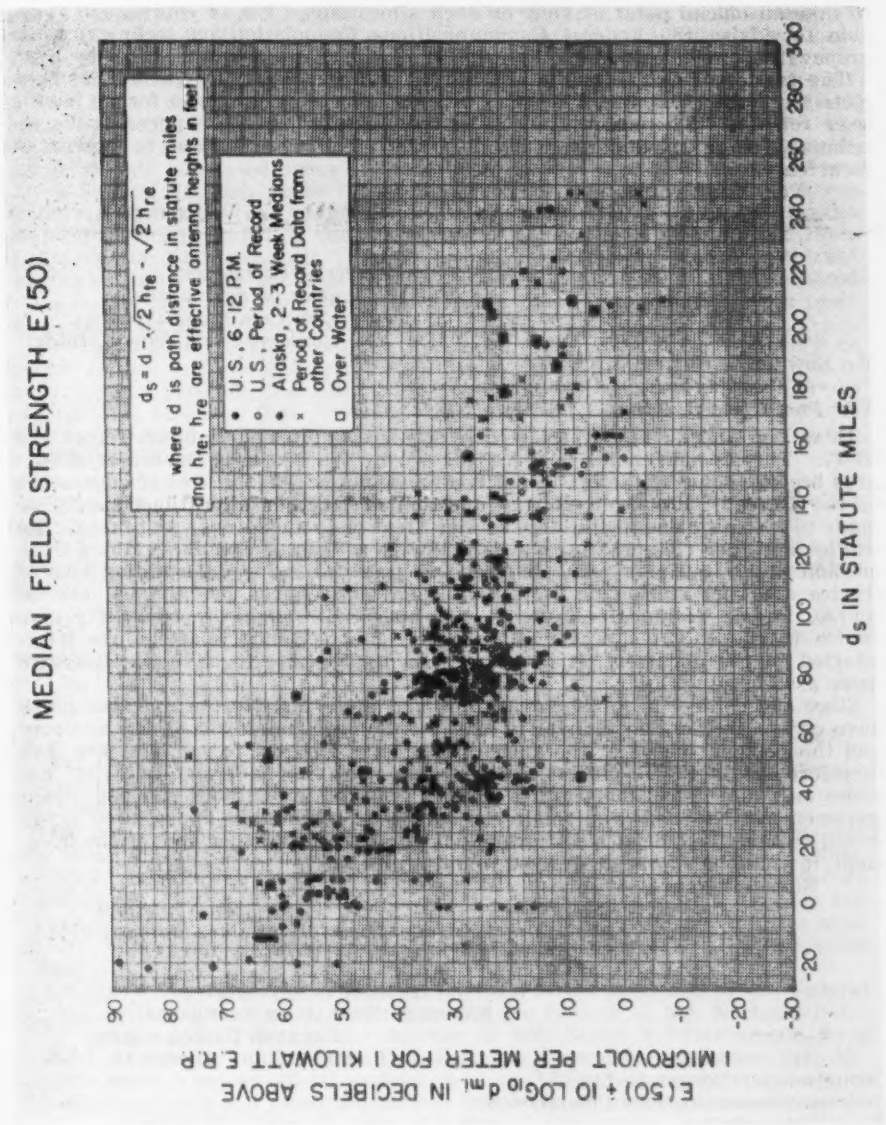
In the sixth paragraph on page 2 of your letter you question the adequacy of the Ohio mobile data. In my letter to Mr. Allen this question is thoroughly treated and it appears from the standard errors associated with each plotted point that the data are, in fact, adequate to establish the existence of such a bias. In any case these are the only data of this kind in the world, so far as I know, and I think it is very fortunate we have even this much information on this question. Note also that this lack of appropriate data can be overcome if the methods of NBS Report No. 5582 are used for allocations as I suggested in my letter to Mr. Allen.

I am sending a copy of this letter together with copies of my letter to Mr. Allen and the addendum to reference E to Mr. Coates and to Mr. Dickson.

Very truly yours,

(S) KENNETH A. NORTON,
Chief, Radio Propagation Engineering Division, Central Radio Propagation Laboratory.

(One of the two illustrations was not reproducible and is on file with the committee.)



U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
Washington, D.C., May 7, 1959.

Hon. JOHN C. DOERFER,
Chairman, Federal Communications Commission,
Washington, D.C.

DEAR MR. DOERFER: This is with reference to the letter of March 27, 1959, to you from Mr. K. A. Norton and the story based on the letter which appeared in the April 6 issue of the magazine Broadcasting.

The letter was sent to you by Mr. Norton in his capacity as a member of TASO and does not reflect the official views of the National Bureau of Standards. It would, perhaps have been more appropriate if Mr. Norton's letter had been

submitted as a minority TASO report. As you know, the National Bureau of Standards has no responsibility for frequency allocations and would not presume to take an official point of view on such allocations. We, of course, are available to advise the Federal Communications Commission on technical radio propagation problems which may arise in allocation studies being made by FCC.

The release of this letter by Mr. Norton to Broadcasting magazine was completely unauthorized, and I wish to express my apologies to you for its having been released. The circumstances surrounding the release appear to be attributable to a misunderstanding and steps have been taken to prevent a recurrence.

Very truly yours,

A. V. ASTIN, *Director.*

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
BOULDER LABORATORIES,
Boulder, Colo., June 3, 1959.

Mr. EDWARD W. ALLEN, Jr.,
Federal Communications Commission,
New Post Office Building, Washington, D.C.

DEAR MR. ALLEN: You were recently sent a copy of memorandum report PM 83–17. This document has been withdrawn by the National Bureau of Standards because some of the matters it treats are not within the area of cognizance of the Bureau. For example, the question of whether allocations should be made to a few stations with large service areas or in such a way as to maximize service area per channel appears to be purely a Federal Communications Commission policy question. The engineering procedures for determining size of service area per station or for maximizing service area per channel are, of course, largely technical questions on which NBS might appropriately give advice to the FCC. However, since policy and technical matters are intermingled in the document, it does not seem appropriate to have the Bureau's name associated with it.

Since the subject is an important one and since Mr. Norton and associates have given considerable thought to many of the problems involved, the analyses and the personal views of the authors may be of interest to you, and you may therefore retain the document for your use with the understanding that the views on nontechnical matters are personal ones of the authors and not official statements of NBS. If you retain the document, it would be appreciated if you would remove the official NBS covers. If you have no further use for the document, it would be appreciated if you would return it.

Sincerely yours,

F. W. BROWN,
Director, Boulder Laboratories.

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
BOULDER LABORATORIES,
Boulder, Colo., August 14, 1959.

Commissioner ROBERT E. LEE,
Federal Communications Commission,
Washington, D.C.

DEAR MR. LEE: Your consideration in sending me a copy of your recent statement (July 8, 1959) to the Senate Interstate and Foreign Commerce Committee is much appreciated. While I still find myself in fundamental disagreement with your main thesis that television should be converted completely to UHF, I did nevertheless find much food for thought in your analysis and, relative to one of your conclusions, I find that I agree with you completely. This is the matter of deintermixture. I quite agree that the addition of more VHF channels on frequencies nearby the present 12 will not solve anything unless assignments are made on these additional channels on a deintermixed basis.

In our letter to Chairman Doerfer, dated March 27, 1959, we stated, "If, after such a reallocation has been made, still further facilities are considered to be really necessary, it would appear to be prudent to add a few channels near, or within, the present VHF band so as to accommodate these additional stations. In this way the modification of the receivers presently in the hands of the public would involve a minimum of expenses." It now seems to me quite clear that the lower part of the present UHF band will serve essentially as well if not better than other channels somewhat nearer to the present 12. The reason for this is that a requirement for channels in addition to the first 12 will arise only in thickly populated areas of the country such as the eastern part of the United States. In such areas the present 12 VHF stations individually serve comparatively small areas because of mutual interference, and consequently the potential service provided on one of the lower UHF channels will be comparable to that on the VHF channels. The fact that UHF stations are currently not competitive with VHF stations in the congested eastern part of the United States is due primarily, as you say, to the lack of receivers, and this can probably best be corrected by deintermixture.

The reason that I believe that the present 12 channels must be retained is to provide service to those sparsely settled areas of the United States where economic factors preclude the establishment of local stations.

I still feel strongly that closer spacings between VHF stations should be permitted so as to foster a more efficient use of the spectrum. However, I see no need for additional VHF channels near the present 12. Furthermore, it seems quite clear that only a few of the present UHF channels will be required for television use in this country, and the remainder should be allocated to other uses.

These comments are, of course, only my personal views. I am taking the liberty of sending copies of this letter to the other commissioners and to other interested individuals.

Sincerely yours,

KENNETH A. NORTON.

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
Washington, D.C., May 13, 1959.

Mr. NICHOLAS ZAPPLE,
Communications Counsel, Committee on Interstate and Foreign Commerce, U. S. Senate, Washington, D.C.

DEAR MR. ZAPPLE: I am forwarding herewith the information requested in your letter of April 9 to Mr. K. A. Norton, Chief of the Radio Propagation Engineering Division of the Central Radio Propagation Laboratory, National Bureau of Standards. In addition, I am enclosing an exchange of letters between Mr. William B. Lodge of the CBS television network and Mr. Norton on the same subject. These communications arose from the publicity given Mr. Norton's letter of March 27.

I am also enclosing a copy of a letter from me to the chairman of the Federal Communications Commission apologizing for the release of Mr. Norton's letter to the press. I believe that any release of Mr. Norton's letter should have been the prerogative of the FCC. Furthermore, I want to emphasize that Mr. Norton's letter is not an official expression of an NBS position primarily because it includes opinions and recommendations involving social and economic matters which are beyond the Bureau's area of technical competence and responsibility.

Very truly yours,

A. V. ASTIN, *Director.*

CBS TELEVISION NETWORK, INC.,
New York, April 13,1959.

Mr. K. A. NORTON,
Chief, Radio Propagation Engineering Division, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colo.

(Cc: Hon. John C. Doerfer.)

DEAR KEN: I have seen a copy of your letter of March 27 to Chairman Doerfer of the Federal Communications Commission concerning television allocations and the activities of the Television Allocations Study Organization. While your letter

is not wholly clear either in its organization or in its substance, I read it to include four general theses:

1. That TASO should have advanced a specific allocation plan;
2. That the TASO report is in error in several technical details;
3. That the motives of industry engineers are subject to criticism and that these allegedly sinister motives are responsible for supposed past FCC allocation errors; and
4. That you have and propose a superior allocation philosophy.

I will take up each of these.

1. Scope of TASO recommendations

I can find no basis for your criticism of the TASO report for not including conclusions concerning "the technical principles which should be applied in television channel allocation."

Apparently you are not familiar with TASO's objectives. Section II of the TASO "Statement of Policies and Operations," dated January 9, 1957, states:

"The objectives of the organization shall be to develop full, detailed and reliable technical information and engineering principles based thereon, concerning present and potential UHF and VHF television service. These principles plus full supporting technical data shall be made available by TASO to the Federal Communications Commission *so that the Commission may be able to determine the soundest approach to television channel allocations. TASO's functions shall be limited solely to technical study, fact finding and investigation, and interpretation of technical data.*" [Italic supplied.]

It was assumed that selection of the specific allocation plan best designed to serve the public must take into consideration economic, social, and legal factors, as well as technical matters. In fact, at a number of TASO meetings, the Government presiding officers directed discussion away from such nontechnical matters with the admonition that the FCC did not expect TASO to make recommendations on allocation or assignment plans.

For the reasons stated above, the TASO report makes so specific allocation proposal.

2. Criticism of technical details in TASO report

You address three criticisms against the technical details of the report. Specifically:

(*a*) You object to TASO's method for defining the service area of a television station. Actually, the work of panel 5 on this subject is not yet complete. Under these circumstances, it might be appropriate for you to reiterate to the panel your belief that the tentatively adopted method is confusing. I doubt that the majority of the panel will adopt a method of defining station coverage if they cannot understand the definitions or believe them to be confusing.

(*b*) You state that TASO "claims to have developed a useful prediction method" for predicting field strength variations and you suggest further field verification before its final adoption. I know of no disagreement on this point. Panel 5 hopes to obtain additional confirmation between predicted and measured field strength before finally adopting the method developed by Professor LaGrone, of the University of Texas. You are, however, misinformed in the belief that no correlations have yet been made between the absolute values of measured and predicted field strengths.

(*c*) You disagree with TASO's decision not to adopt the CRPL transmission loss prediction formula for specific terrain conditions. Although Mr. Rice attended many of the meetings, you may not be familiar, personnally, with some of the problems faced by panel 4, and particularly its committee 4.2 (interference fields). These problems included delays and changes in information supplied by CRPL, which resulted from repeated changes in your assumed model of the earth's atmosphere. The panel and its committee, in their final meetings, were forced to choose between an empirical method, which was available, and your theoretical formula, which was still subject to revisions to be submitted at some future date. In fact, the chairman of committee 4.2, Mr. George Davis, advised me only last week that he understands modifications are still being made in the CRPL transmission loss formula and that a further report on this proposal will be provided in the coming months. It is difficult to see why you object to the committee's not adopting an amorphous and still-unfinalized formula. Your criticism of the committee's decision is even more confusing when it is noted that Mr. Rice of CRPL (one of the cosigners of your letter) approved the final report of committee 4.2.

So much for your comments concerning the TASO report. In summary, (*a*) there have been honest differences of opinion among members of the panels and committees, (*b*) in some of these differences the majority of the members have been in disagreement with a CRPL representative (*c*) there may be some other method of resolving these differences than by majority opinion, but you have suggested no substitute, (*d*) I know of no instances in which the TASO decisions were biased by the "selfish interests" of industry engineers, (*e*) several of the detailed decisions of TASO, about which you are concerned, are still under consideration, and (*f*) technical studies frequently have to be "sawed off" somewhere short of perfection to meet deadlines and to stay within budgets.

In my opinion, none of the points you have raised, regardless of their ultimate decision, should materially detract from the value of TASO's important compilation of technical data as a reliable aid to the FCC in its allocation studies.

3. Industry motives; the FCC

Your letter includes a gratuitous attack on the FCC for past allocation actions which you say result "from its desire to please everyone." In a masterpiece of oversimplification and classic example of scapegoatism, you also attribute the FCC's allocation troubles to "a tendency to lean too heavily on the advice of industry engineers who obviously have their own selfish interests to protect." Your letter to Chairman Doerfer adds the belief that "the television industry induced you to use wide separations by capitalizing on your desire to protect the rural televiewers," and that "this is certainly a fallacious argument."

This sort of attack contributes little to the solution of an exceedingly difficult and delicate task with which the public, the FCC, and the industry are faced. We may concede that past allocation actions have not been wholly correct; indeed the FCC's own intensive and comprehensive reexamination of the problem establishes that the FCC itself is aware of this. I am convinced that the exploration of why who did what to whom carries us backward and not forward.

As one of the industry engineers, I deny your allegation of motivation. You could have concluded that industry engineers made an honest mistake in not agreeing with your recommendation that cochannel spacings be drastically reduced. It is also possible that your recommendation is wrong. You have suggested a third alternative: that industry engineers have supported a plan contrary to the public good "for their own selfish interests."

I would suggest, Ken, that there may be a fourth reason for the disagreement as to station separations: that you have either oversimplified the allocation problem by believing it to be entirely technical in nature, or else that, without adequate background, you have attempted to draw conclusions on the many nontechnical factors which should be taken into account in allocation planning. It is generally agreed that similar disregard for the facts of life led to our present allocation plan, in which UHF stations are assigned to the same markets as VHF stations.

It is my personal opinion that the industry engineers have just as much integrity and ability as you and your associates. I happen to believe, also, that your allocation proposal—cochannel separations of 100 miles or less—would seriously degrade television service to the American public. But I would not imply that your recommendation involves professional dishonesty or a desire to achieve some selfish aim. Anyone with engineering training respects the value of a theoretical approach. But it seems improper for a physicist with no business experience to impugn the motives of engineers who take into account practical considerations which could hardly have received proper attention in your theoretical analysis.

Perhaps an ideal solution to the allocations problem can never be achieved. But we should come closer if we address ourselves to the merits and do not get distracted by their irrelevancies of motives.

4. Allegation philosophy

My chief reason for commenting on your letter of March 27 is the fact that you have proposed an allocation philosophy which I believe to be impractical, unwise and contrary to the public interest.

In making a specific recommendation that the Commission adopt a minimum cochannel spacing of 100 miles or less, you may have attempted to take into consideration such matters as program availability, cost of station operation, economic support, and the Communications Act requirement that broadcast facili-

ties be assigned equitably among the several States and communities. For you mention accommodating "all of the really important and economically feasible TV requirements in this country." Your letter dismisses one plan as "probably economically unsound." You state that your plan is designed to "serve the public interest, convenience and necessity." In connection with low power VHF translators, you mention communities "where more elaborate installations are not economically feasible." And you state categorically that the present cochannel separations "cannot be justified on any other grounds than administrative convenience."

As mentioned earlier, TASO deliberately refrained from making a specific allocation proposal because of the many nontechnical factors involved. And, it does not seem unfair to question your expertness in matters involving the economic support and programing of television stations. It was noted above that inadequate knowledge of economics and programs, as well as some unanticipated practical problems in UHF reception, led advocates of VHF–UHF intermixture to expect UHF stations to compete successfully with VHF stations. These advocates confused circles drawn on a map with actual service to the public. We now know that hundreds of thoretical circles supposedly representing UHF service to the public never eventualized into actual service. Others existed for a few years and then stopped. Your current proposal could suffer the same deficiency: increased interference will reduce existing service areas, but how can you be sure that the theoretical "replacement" circles will actually be built in the areas losing service—or, if built, will carry equivalent programing?

I also differ sharply with your treatment of the rural television viewer. While you state his loss of service due to interference "admittedly is a difficult matter," you apparently conclude that because there are more people in metropolitan areas (who already may have several services) we should give more service to the metropolitan areas at the expense of rural areas because "it is, after all, only people who will use the service." How does this argument differ fundamentally from the approach that has been used in the standard (AM) broadcast band, with well known and disastrous results for the rural radio listener?

You say that retaining wide separations to protect rural televiewers is a "fallacious argument" against the adoption of shorter spacings. Yet, your letter makes no attempt to show that the rural audience would not lose service. To the contrary, if I interpret it correctly, your reasoning runs as follows: (1) rural areas already receive poorer television service than metropolitan areas, (2) more people live in metropolitan areas than in rural areas, and (3) therefore, loss of rural service should be ignored so that still more stations can be built in the more populous areas.

Is this one of the "objective technical principles for developing an allocation of television channels designed to serve the public interest, convenience and necessity" mentioned in the second paragraph of your letter? Frankly, it sounds more like a social or political conclusion on your part than an "objective technical principle"—and it is an erroneous conclusion, at that. For it discriminates against the rural population of this country, and it indicates ignorance as to the extent of television viewing at 50-to-100 mile distances from the nearest station.

On page 4 of your letter you state that a reduction from 170 miles to 120 miles in cochannel spacing would "actually double the potential number of stations on the channel" and that "the grade C service area per channel" would thereby be decreased by only 6.5 percent.

For some reason you do not add the obvious corollary: That this also means cutting the service area per station to less than half.

With that in mind, did you take into account (a) the fact that television stations in this country are not Government operated but are supported by income from advertising, (b) the extent to which advertisers would place programs on the reduced-coverage stations, and (c) how this might affect the stations' survival, their hours of operation, and the type of programs carried? Similarly, if services areas are reduced, how many television services and what kind of programing would be made available for the more distant television viewer who now has the same choice of programs as the city dweller? (For example, a viewer in Bridgeport, Conn., 55 miles from New York, now may choose from the same seven program services that are available to a resident of New York City. What would the Bridgeport resident have under your proposal?) Did you consider the fact that, with close-spaced stations, interference ratios will be increased because of congestion in offset-carrier assignments? And did you take into ac-

count the fact that establishment of one of your close-spaced stations could deprive an area of two existing services? (For example, a new station on channel 3 in Ogden, Utah, would substantially obliterate reception in that city of KUTV and KTVT, Salt Lake City, on channels 2 and 4.)

In closing, I would like to express my respect for the many contributions in the field of radio wave propagation which have been made by the Central Radio Propagation Laboratory. TASO's findings would doubtless have been less comprehensive and less useful to the Federal Communications Commission without the generous assistance of CRPL experts.

I believe that your disagreement on three details in the TASO report, regardless of how resolved, raises no question as to the value of the report in the FCC's allocation studies. I regret that you felt justified in criticizing the objectivity of industry engineers when their judgment did not coincide with yours. And, most of all, I question your wisdom in proposing a general allocation philosophy because of the many nontechnical matters involved, which are beyond your field of expertness.

Very truy yours,

WILLIAM B. LODGE.

MAY 1, 1959.

Mr. WILLIAM B. LODGE,
Vice President of the CBS Television Network, New York, N.Y.

DEAR BILL: I was most pleased to receive the letter from you dated April 13 with comments on our letter of March 27 to Chairman Doerfer of the Federal Communications Commission. I welcome this opportunity to debate this matter further with the vice president in charge of engineering for the CBS Television Network. Such a debate seems to me to be especially appropriate since the Columbia Broadcasting System has a long and enviable record in the field of public service and will, I am sure, be especially sensitive to the merits of any proposals which may be made to further the public interest in the television broadcast field. It is also appropriate by virtue of the fact that CBS not only operates a television network but also operates several individual television stations and is thus in a position to take a broader view of the matter than would be expected of an individual station owner.

I was rather amused by your statement that "your letter is not wholly clear either in its organization or in its substance" since you then proceeded to list the four points we intended to make. More seriously, however, it is possible that you no longer have available in your files the references included in our letter to Chairman Doerfer, and this may have led to the lack of clarity you mention. I am enclosing herewith this reference material, including a memorandum dated November 20, 1950, to the FCC ad hoc committee transmitting for their consideration the addendum to reference E. Mr. Jay W. Wright was the CBS representative on this ad hoc committee and you should find this material in his files.

With this introduction it will be convenient to continue the debate by discussing in turn each of the four points, as described in your words, which we made in our letter to Chairman Doerfer.

"1. That TASO should have advanced a specific allocation plan"

Our actual comment was "the report does not deal explicitly with the problem of specifying 'the technical principles which should be applied in television channel allocation'." The quotation we made was from the FCC, public notice 35638 proposing the establishment of TASO and presumably reflects the Commission's desires in the matter. In any case it certainly represents the kind of information which I have long felt must be supplied to the FCC if it is to carry out its task in this field with efficiency.

In my reservation to the endorsement of volume II of the ad hoc committee report dated July 26, 1950, I stated: "Finally, I wish to point out that the ad hoc committee has so far not undertaken a study of the spacings between cochannel and adjacent channel television stations required for their efficient allocation in accordance with the priorities of appendix A of the FCC proposal in report 49–948 dated July 11, 1949. Until such studies are made by one of the valid methods in volume II, this report of the ad hoc committee can serve no useful purpose to the Commission in its forthcoming allocation proceedings. Because of the length of time required for carrying out such studies, it is imperative that they be started at the earliest possible date if they are to be available this year." Later that year I prepared the addendum to reference E

which does treat the question of the optimum spacings between stations, but this addendum was not considered since the chairman failed to call a meeting of the ad hoc committee for this purpose.

More recently I also made a plea to TASO to consider the question of station spacings, but again this matter was not considered appropriate by this industry-dominated committee.

Is it any wonder that I question the wisdom of the FCC in leaning so heavily on the advice of the industry engineers in its allocation planning?

I fail to understand the value to the FCC of a TASO report which does not organize into concise technical principles of allocation the great body of valuable engineering data which it has accumulated during the last few years. It must be remembered that most of the Commissioners are not engineers and, to be truly useful, this technical information surely should be digested and converted into conclusions which are directly useful for the efficient allocation of television channels.

"2. That the TASO report is in error in several technical details"

Since there was no provision in the TASO report for a minority opinion from its Government members, it seemed to us to be appropriate to make these reservations in a letter to the Chairman of the FCC.

You indicated that we were "misinformed in the belief that no correlations have yet been made between the absolute values of measured and predicted field strengths." We recognize that such correlations were made and only noted in our letter that a high correlation is not necessarily a safe measure to use in validating a prediction formula. We use the root mean square value of the deviations between the observed and predicted values expressed in decibels as a proper measure of the accuracy of our own formula, and question whether the TASO method has an rms error as small as that given by our formula for the wide range of conditions to which it applies. Note that it is possible to have a very inaccurate formula with a large rms error even with a correlation near unity, and conversely it is possible to have a very accurate formula with a small rms error even when the correlation is near zero. Thus it is evident that correlation studies alone provide inconclusive proof of the adequacy or inadequacy of a proposed prediction formula.

"3. That the motives of industry engineers are subject to criticism and that these allegedly sinister motives are responsible for supposed past FCC allocation errors"

Our actual comment was "and a tendency to lean too heavily on the advice of the industry engineers who *obviously* have their own selfish interests to protect. Thus we believe it may not necessarily be true that an allocation designed to serve the best interests of the *individual* television stations will at the same time best serve the public." [Italic supplied.] Note that the use of spacings designed to maximize the service area per channel, and thus maximize the total service provided to rural as well as urban areas, will in fact lead to a reduction of the service areas of the individual stations. In fact if the 100-mile minimum rule were to be adopted by the FCC, the total area, both rural and urban, provided with service for each channel allocated to television would be increased substantially over that now available. Furthermore, this desirable increase in the overall area provided with service is accomplished by adding more stations on each channel, thus making possible, in addition, a larger number of different services in areas (both rural and urban) already provided with service. The price which must be paid for this increase in total service area and number of services available on each channel is a (usually small) reduction in the area covered by the individual stations although, in those few cases where the spacing would be as small as 100 miles, each of two stations so spaced would have its individual area reduced to about a half of the area which it would have been able to serve if it were the only station on the channel, i.e., if it were a clear channel station. Thus we see that, although our proposal does not represent any compromise at all with the public interest in television since it provides for a greater coverage of both area and number of services, it would have the effect of reducing the service areas of individual television stations.

I cannot agree that we implied any sinister motives to the industry engineers by pointing out the obvious fact that at least these engineers associated with the individual stations have a selfish interest in seeing that the current wide spacings between stations are maintained. It seems to me to be probable, how-

ever, that the best interests of the television networks would coincide with the best interests of the public, and thus I would expect you to favor the reduced spacings which we advocate, although the network ownership of individual stations may have an overriding influence on your attitude.

Finally, just to keep the record straight, I want to state that I have the highest regard for the integrity and ability of the engineers in the radio broadcast field. I have been closely associated with these engineers in various activities ever since 1934 when I was employed by the FCC to undertake the engineering propagation survey associated with the original standard broadcast band clear channel study, and have during this period acquired a great respect for their judgment and ability. I regret the language you used in your letter in this connection and can only hope that those who read your letter will also have an opportunity to read what we actually said in our letter to Chairman Doerfer.

Although I might agree with you that it is usually true that "the exploration of why who did what to whom carries us backward and not forward," in the present case I believe it is the very essence of the matter to discover why a very sound allocation proposal which I made in 1950 was rejected by the FCC. The cost of this FCC allocation error to the public during the past 7 years in reduced television service in both urban and rural areas and in the increased cost of all band receivers as well as the cost to the communications industry and to national defense in not having the UHF television band available for other services has already been very great, and it seems to me that this regrettable situation should be corrected in some appropriate way at the earliest possible time.

"4. Allocation philosophy"

The primary purpose of our letter and of your reply was the discussion of the philosophy of allocation which we proposed. You imply in your discussion that we are in some way responsible for the FCC erroneous approach to the allocation problem. Then you state, "It is generally agreed that similar disregard for the facts of life led to our present allocation plan, in which UHF stations are assigned to the same markets as VHF stations" and later "It was noted above that inadequate knowledge of economics and programs, as well as some unanticipated practical problems in VHF reception, led advocates of VHF–UHF intermixture to expect UHF stations to compete successfully with VHF stations. These advocates confused circles drawn on a map with actual service to the public. We now know that hundreds of theoretical circles supposedly representing UHF services to the public never eventualized into actual service. Others existed for a few years and then stopped. Your current proposal could suffer the same deficiency; increased interference will reduce existing service areas, but how can you be sure theoretical replacement circles will actually be built in the areas losing service, or, if built, will carry equivalent programing." In this connection I wish to quote what I said in 1950 in the addendum to reference E. "In view of the doubt expressed by many witnesses as to the economic acceptability of UHF channels and the fact that the ad hoc committee has limited its study to VHF frequencies, I will assume, for the sake of simplification of my further discussion, that such stations will not play an important role in the allocation problem." Subsequent events have certainly proven the wisdom of that assumption. It should be noted, too, that my proposal suggesting the use of closer spacings was designed at that time and can equally serve now to provide an alternative method of allocation which does not require the use of the UHF band.

I also wish to disassociate myself from those FCC allocation planners who, largely for reasons of administrative convenience, decided to plan in advance the entire future of television in this country by assigning individual channels to each of the major and even to many very minor urban communities throughout the country. Such planning seems clearly to be wasteful of the radio spectrum since economic factors rather than wishful thinking lead to the establishment of television stations. Thus it seems to me that the appropriate procedure for television station allocation is to first assign an appropriate portion of the spectrum to this use and then to allocate stations on a first-come, first-served basis just as was done in allocating stations to the standard broadcasting band.

In your letter you raise the question, How can you be sure that theoretical "replacement" circles will actually be built in the areas losing service? My proposal is simply that the FCC relax their present 170-mile minimum rule to 100 miles. In the unlikely event that no potential broadcaster availed himself of the opportunity of operating a station at a closer spacing than 170 miles, then

it would appear that there is no economic support for such additional stations and consequently no possibility within the framework of the American free-enterprise system of sustaining such additional stations. On the other hand, if it is economically feasible to operate such additional stations, there will certainly be many applicants for these potential facilities.

You also ask whether these new stations "will carry equivalent programming." I do not profess to know the correct answer to this very pertinent question. It is my own personal opinion that the operation of an unlimited number of competing broadcasting services is not necessarily in the public interest. Thus the division of a supposedly limited number of advertising dollars among too many broadcasters may well lead to a deterioration in the quality of the service they provide. However, it is my understanding that the FCC, the majority of Congress, and most of the industry all profess to believe that much more competition between broadcasting stations is desirable and, under these circumstances, my only responsibility is to devise technically efficient ways for accomplishing this objective. You will note that we suggested that the FCC first make efficient use of the present 12 television channels and then, if further requirements are evident which are of comparable importance to other potential uses of this portion of the spectrum, add additional channels. If and when these additional channels are added, it is important that the real needs of the country for a long time in the future be kept in mind before this step is taken, so that the receiver obsolescence necessarily accompanying such a step will not have to be repeated too often in the future.

Since you have elected to identify yourself with those who irrelevantly argue that rural and urban areas somehow differ for television allocation purposes in some way other than in the number of people residing in them, it seems desirable to dwell on this question further. I know of no sensible way of catering further to the interests of the rural televiewers other than by maximizing the total area provided with service for each channel allocated. The further step which could be taken to cater to the rural televiewers would be to systematically locate the stations in the most sparsely settled areas, but such a proposal appears to be pure nonsense since it would result in actually minimizing the population provided with service for a given area served. Surely even the most avid of the exponents of providing rural coverage would not subscribe to a plan which actually minimizes the population provided with service. If you know of any more practicable way of improving a broadcast coverage of rural areas than by maximizing the total area covered per channel, then I would like to know about it.

We did not state that the loss of rural service due to interference "admittedly is a difficult matter". Rather we said that the reductions of the existing spacings between stations will create interference for many televiewers residing between the stations. However, more of these televiewers who are subject to this interference will live in urban than in rural areas and most, if not all, of these televiewers who will be subject to this interference will have several other services available from other stations. It is nevertheless always a difficult matter when interference is created to an existing service, but I cannot see how this can be avoided if the service area per channel is to be maximized.

We also suggested another technically feasible plan for improving the service to rural areas and to small urban communities, and this was the use of low-power VHF translators and boosters. The use of many such low-power television stations would make possible the provision of television service to many millions of rural televiewers who live in communities too small to provide support for more elaborate installations. Admittedly, it would be difficult for the originating stations and the networks to control this type of operation, but it would appear to serve well the interests of these rural communities and this, after all, should be the first consideration of those professing to have the best interests of the rural televiewers in mind.

You ask how our "argument differs fundamentally from the approach that has been used in the standard (AM) broadcast band, with well-known and disastrous results for the rural radio listener?" The answer is that it differs from that approach only in degree and in the nature of the propagation, but I am unaware of the disastrous results to the rural radio listener. It is my impression that the principal difficulty with the rural standard broadcast coverage provided in the country is the failure of the FCC to permit the broadcasting stations—particularly those on the clear channels—from using ade-

quate power to provide a satisfactory nationwide coverage. The United States is, I believe, one of the few countries in the world where the maximum permissible broadcast power is only 50 kilowatts. I have always advocated the use of the highest economically feasible power for radio broadcast stations. It is a common misconception that the use of higher power causes more interference. This point is elaborated in more detail in my other enclosure to Chairman Doerfer which was a memorandum report on "System Loss in Radio Wave Propagation". In this report I show that it is only the ratio of the powers used by two stations which is relevant to their mutual interference and that the horizontal increase of the powers of both stations so that both may override the effects of noise will nearly always result in a substantial improvement of service.

You indicate that we are ignorant "as to the extent of television viewing at 50- to 100-mile distances from the nearest station." We are, on the contrary, well aware of the extent of that viewing, but I know of no such televiewer who would not prefer to be able to receive clearer nonfading signals from shorter distances if such were available. Under our proposal many such additional signals would be made available and in no case would it be necessary to destroy any present service without the addition of a larger area of coverage by the new stations. In fact, the very essence of our plan is to maximize the coverage of area within the limits of economic feasibility. And our proposal envisages the determination of what is economically feasible by the individual investor rather than by the FCC. Even after our plan is adopted there may well be many sparsely settled areas in the United States where the televiewer must still receive his service from distances of 50 to 100 miles and at even greater distances simply because the operation of television stations in such areas is unprofitable; in such cases this long-distance service would, of course, still be available since no interfering station would be constructed. However, if our proposal were adopted, no areas capable of providing economic support to the operation of television stations would be deprived of good television service. The present FCC policy is to protect from interference the large secondary service areas in which existing stations provide a barely satisfactory and intermittent service, and this forces the rural televiewers to use this relatively unsatisfactory service; if our plan were adopted, such presently protected areas would be supplied with superior service from local stations. Thus in a very real sense the present FCC policy actually deprives the rural televiewers in many localities from having higher quality services and forces them to rely on service from stations 50 to 100 miles away.

Summarizing the above, we see that our reduced spacing plan serves the interests of the rural televiewer by (*a*) permitting the construction of local television stations using the highest economically feasible[1] power in areas not now adequately served, (*b*) using to maximum advantage the VHF channels which are the only ones capable of providing extensive coverage at reasonable cost, and (*c*) maximizing the area covered per channel. The alternative so far proposed is the use of more channels at higher frequencies. These additional channels cannot provide the long ranges possible with the present VHF channels and would thus prevent the sparsely settled rural areas from receiving an improved service.

Finally, may I note that we would not have had the temerity to pose as television allocation experts except for the fact that the present experts in this field seem to be unable to agree on the best method to use for solving this important problem and, while professing to have the best interests of the rural televiewers at heart, propose plans which may ultimately lead to a complete loss of rural coverage.

Having answered all of your questions, I think it is not unfair if I ask you to answer a few.

(1) How do you propose to solve the television coverage problem other than by maximizing the coverage of area?

(2) Considering that maximizing the area per channel rather than maximizing the area per station (*a*) requires the use of less spectrum for a given coverage of area, (*b*) permits the operation of a larger number of individual stations on radio frequencies with similar propagation characteristics, thus providing more nearly equal facilities to these stations, and (*c*) provides a higher

[1] The highest economically feasible power may in some cases be that of a low-power translator or booster.

quality of service throughout the area served, how can you conscientiously advocate the use of spacings which do not maximize the area covered per channel?

(3) Is the determination of the optimum spacing between television stations which is required to maximize the area covered per channel a technical question suitable for analysis by TASO?

(4) Did TASO study this technical question?

(5) Did the ad hoc committee report any analysis of this technical question?

(6) In what way does "program availability, cost of station operation, economic support, and the Communications Act requirement that broadcast facilities be assigned equitably among the several States and communities" enter into the determination of the answer to this purely technical question?

(7) Is the answer to this question of interest to the FCC in view of their stated first priority of "providing at least one television service to all parts of the United States"?

(8) Is the minimization of the spectrum required for television of value to other potential users of the radio spectrum?

I will be most interested in receiving replies to the above questions, together with any reaction you may have to the answers I supplied to your questions.

With best personal regards,

Sincerely,

KENNETH A. NORTON,
Radio Propagation Engineering Division,
Central Radio Propagation Laboratory.

MAY 14, 1959.

Office Memorandum, U.S. Government.

To: Dr. A. V. Astin, Director of NBS. Via: Dr. F. W. Brown, Director of BI, NBS.

From: K. A. Norton, Chief of Division 83.

Subject: Request from Senate Committee on Interstate and Foreign Commerce.

Because of the recently revived interest in the technical question of the optimum geographical spacings between television stations, I have prepared the enclosed memorandum report which assembles my recent correspondence and some of the material presently in the public record relative to this question.

I attempted to present a balanced report, but found that this was difficult since there is little or nothing in the record which challenges the technical validity of our analysis. In fact, as I have already pointed out, this matter was not considered appropriate for discussion either by the ad hoc committee or by TASO.

This memorandum report will be more convenient for use by the Senate committee than the material I submitted to you earlier for forwarding to Mr. Zapple, and I suggest that you forward a copy to him.

An extra copy is enclosed for your use, and I have sent copies to the Commissioners and to the Chief Engineer of the FCC.

U.S. DEPARTMENT OF COMMERCE,
NATIONAL BUREAU OF STANDARDS,
Washington, D.C., November 20, 1950.

Memorandum to: Member of the ad hoc committee.

You will find enclosed herewith an addendum to reference E by Kenneth A. Norton together with a report, "A Study of the Influence of the Geographical Distribution of Population on the Coverage Obtainable From a National Television System," by Kenneth A. Norton and Leon Gainen. These reports, together with reference E itself, provide some background material which should be useful for the establishment of technical rules for the allocation of television broadcast stations in such a way as to satisfy the Commission's policies as stated in its priority principles.

As you may remember, it has been my position from the beginning that the work of the ad hoc committee should not end with the publication of volume I but should proceed until a clear set of technical rules has been established which will permit the allocation of stations in a pattern which is efficient in the sense that it satisfies the Commission's priority principles. It has been argued that

such technical rules are policy matters and, as such, should not be formulated by the ad hoc committee. It has been my position, however, that the formulation of technical rules to carry out a stated policy is, in itself, not a policy matter at all and can be accomplished on purely objective technical grounds. In the attached addendum to reference E you will find several such technical rules stated. Some of these technical rules satisfy one policy best; others satisfy an opposing policy best. The statements of these rules are simply conclusions reached from our physical analysis of the problem; they represent a digest of our experience with the problem and are just as objective and devoid of policy considerations as ohms law or Archimedes principle.

I believe that a study leading to the endorsement of these or other more useful technical allocation rules which other members may suggest should be undertaken by the ad hoc committee and hope that the chairman will call a meeting to consider this matter at some appropriate time in the future.

Very truly yours,

KENNETH A. NORTON,
Member of the Ad Hoc Committee for the Evaluation of the Radio Propagation Factors Concerning the Television and Frequency Modulation Broadcasting Services in the Frequency Range Between 50 and 250 Mc.

FCC Dockets 8736, 8975, 9175
OCTOBER 16, 1950.

STATEMENT OF KENNETH A. NORTON, MEMBER OF THE AD HOC COMMITTEE FOR THE EVALUATION OF THE RADIO PROPAGATION FACTORS CONCERNING THE TELEVISION AND FREQUENCY MODULATION BROADCASTING SERVICES IN THE FREQUENCY RANGE BETWEEN 50 AND 250 MC.

Mr. Chairman and Members of the Commission, this statement is intended to clarify my reservations to the endorsement of volumes I and II of the ad hoc committee report, together with its references C and M, inclusive.

Since writing my reservation of volume I, which was published on May 31, 1949, the ad hoc committee has developed several satisfactory methods for determining the combined effects on a desired signal arising from more than one undesired signal. In view of the present availability of these methods which are reported in volume II of its report, I am now in a position to endorse volume I without reservation.

It is my opinion that the long-normal method of combining interference from several sources, as described in volume II, appendix D and in reference M, is the most accurate and workable method presently available for evaluating the location probability of service. The method described in volume II, appendix B and in reference E is somewhat less dependable than this preferred log-normal method and, since it is not a simpler method, has nothing to recommend it now that the log-normal method is available. The method described in volume II, appendix C and in reference L is the simplest method of all but is, unfortunately, not a dependable method. I would strongly recommend against its use since I believe this would result in deceptively inaccurate values for the location probability of service in many critical applications.

In section VIII of reference E a discussion was presented of a method for determining the geographical separation between television broadcast stations required for the efficient coverage of the greatest area with interference-free service. In this discussion the stations were located in a triangular lattice since this was considered to be nearly the most compact arrangement of such stations which can be imagined. It has been objected that this is unrealistic since there would seldom be good television transmitter locations (particularly in large cities) exactly at the locations required by the triangular lattice concept. We did not expect that such a regular pattern of suitable transmitter locations could be found but believe that the results obtained with the stations located a short distance away from these idealized locations would not be much different than those obtained with the stations located exactly at the intersections of the triangular lattice. Furthermore, I do not believe that it has yet been established that the best location for a television station is necessarily always in a large city but believe that a good case might be made for locating television stations half way between cities, at least in some cases. An extensive study

of this possibility has been made for a particular typical case and I hope to report on this in a later appearance at this hearing.

The point has also been raised that our use of coverage area as a criterion of efficiency implied the endorsement or advocacy of this as a policy with regard to the allocation of television broadcast stations. This, of course, was not my purpose since I do not wish, as a representative of the National Bureau of Standards, by implication or otherwise to advocate any position on policy questions in this field; such policy questions are clearly the function of the Federal Communications Commission. Actually, of course, the Commission itself has proposed in part III of appendix A of its notice for this hearing to adopt an allocation table prepared under the guidance of a set of principles, in terms of priorities, of which the following two are typical:

FCC priority No. 1: To provide at least one television service to all parts of the United States.

FCC priority No. 2: To provide each community with at least one television broadcast station.

Thus, our study of methods of maximizing the area of coverage is merely responsive to the issue proposed by the Commission in stating that complete coverage of area is to be No. 1 in priority. Our study was intended to be an objective analysis leading to quantitative criteria measuring the degree to which various allocations achieve the goal which the Commission has proposed to be of highest priority. In this connection, I think it is appropriate for me to point out that I feel that the measurement of the area within an iso-probability of service contour (as was also proposed in appendix A of the Commission release) is not an adequate criterion for the determination of allocation decisions. Instead I recommend the use of the integrated service area as determined by the first equation on page 4 of volume II of the ad hoc committee report. The thing that is misleading about the iso-probability of service contour method of assessing service is the fact that it implicitly ignores the televiewers beyond such a contour even though large numbers of them are able to receive an equally good grade of service. It seems to me that people living beyond a contour but who are in receiving locations where service is available for at least, say 90 percent, of the time deserve exactly as much consideration as those people living within the contour where service is also available at least 90 percent of the time. Thus, the use of a single contour for measuring service area makes no allowance for the rate of deterioration of service with increasing distance from the station; if it is then proposed that several such contours be used to alleviate this difficulty, then in effect, an approximation to the correct integrated area method of measurement has been adopted.

It is true, of course, that the triangular lattice idealizes the allocation problem but it is my opinion that the only realistic alternative approach would be a study of the actual allocations proposed by various parties to this hearing using the method of the ad hoc committee report. It is my opinion that the use of this alternative approach is practicable in any contested cases which may develop during the course of these proceedings.

In any case I believe that our triangular lattice study in references E and K has at least established by induction from the many special uses we have considered several general principles which will be true under any assumed arrangement of television stations as follows:

1. There is a unique allocation of a given number of television stations which will be optimum from the standpoint of maximizing the total area of coverage which may be attained with a given set of television channels.

2. The percentage of the total area which can be provided with service is a slowly varying function of the spacings between stations and consequently these spacings may depart substantially from the optimum values without a serious loss in total service area.

3. If wider spacings between stations are adopted than those determined by this optimum arrangement then less total coverage of area will result, due largely to an increased amount of interference arising from noise. Futhermore, it is also clear that these wider spacings will result in the allocation of a smaller total number of stations.

4. If narrower spacings between stations are adopted than those determined by this optimum arrangement, then less total coverage of area will result, due largely to an increased amount of interference arising from the other stations. It is also clear, however, that the use of these narrower spacings will permit the allocation of a larger total number of stations and this will be in the direction of more adequately satisfying FCC priority No. 2.

5. The use of the maximum available antenna heights and maximum practicable power ensures covering the maximum total area. Although a horizontal increase in power for a given geographical arrangement of television stations will increase the number of receiving locations at which interference between such stations is noticeable, it will not increase the mutual station interference at any receiving location and will reduce the interference arising from noise at all receiving locations. A horizontal increase in transmitting antenna height is even more advantageous since it will not only reduce the interference arising from noise at most receiving locations but it will also reduce the mutual station interference at most receiving locations.

It is generally conceded that the problem of properly assessing the influence of the terrain and the troposphere on radio wave propagation in the band 50–250 mc is exceedingly complex. Although a real effort was made in the ad hoc committee to reduce the difficulties of understanding these effects to a minimum by attempting to prepare a clear exposition of the problem, the results we actually achieved along these lines evidently leave much to be desired as is evidenced by the reservations many of the committee members felt constrained to make in their endorsement of the report and its supporting references. During the past few weeks at the National Bureau of Standards, we have held a series of discussions for the purpose of reviewing the subject matter of ad hoc committee references C, E, K, and M. The conclusions reached as a result of that review are contained in a letter from Dr. E. U. Condon to Mr. E. W. Allen dated October 9, 1950; this letter has already been introduced in evidence. During the course of these discussions Dr. Condon prepared a review of the ad hoc committee report; this was prepared partly in order to assist his own understanding of the problem but also in order to assist some of the other participants in our Bureau discussions in gaining an appreciation of our approach to the ad hoc committee problem. I have read this review and feel that it is a remarkably clear exposition of the matter. With the thought that it might help others in the industry or in the Commission to a better understanding and appreciation of our problem. Dr. Condon has permitted me to offer it in evidence at this hearing. A copy of this review is attached at the end of my prepared statement. It may be that the Commission will feel that its purpose as educational material will be satisfactorily served merely by informally distributing it to those present here today. This review does not represent a policy position taken by the National Bureau of Standards since all such policy questions in this field are clearly the responsibility of the Federal Communications Commission. Instead, it is merely a clearly written exposition of the nature of what has turned out to be an extraordinarily complex technical problem. As such its availability here today may indirectly assist to some degree in the conduct of this hearing.

OCTOBER 6, 1950.

REVIEW OF THE AD HOC COMMITTEE REPORT[1]

(By E. U. Condon, Director, National Bureau of Standards)

It is generally conceded that the subject matter of the radio propagation factors affecting television and FM broadcasting services between 50 and 250 megacycles is fairly complicated and that our present knowledge leaves a great deal to be desired. Steps are being taken to improve the situation by further research.

The report attempts to outline present knowledge, to point out wherein that knowledge is inadequate, and to develop a method of analysis for dealing with problems of mutual interference between stations. There have been some complaints that the report and its attached references are difficult to understand. This review is written in an attempt to reduce that difficulty. The review does not go into full detail. For that, the report itself will need to be consulted.

1. The report proceeds on the premise that it will be necessary to deal with the field of a transmitter by statistical methods because of the erratic fluctuations to which the field is subject

[1] These notes were prepared in connection with an internal editorial review of those parts of the report which were prepared at the National Bureau of Standards.

These fluctuations arise as a random time variation of received signal at a fixed location because of various propagation factors due to changing atmospheric conditions. Such time fluctuations exist at all distances to some degree but become especially pronounced at distances beyond the horizon.

The received field at the same instant also fluctuates greatly from point to point over small areas at essentially the same distance from the transmitter. These space fluctuations are due to the large amount of scatter produced by the terrain, including trees and buildings.

Because of these large fluctuations it is necessary to adopt a mode of analysis which treats of the fraction of the time at a given location that the received signal is greater than a given value, as a means of describing time fluctuations; and treats of the fraction of the receiving locations in which the received signal is greater than a given value for various fractions of the time. A large part of the report is concerned with analyzing the data for the purpose of getting at such a measure of the amount of such space and time fluctuations.

2. In dealing with fields which show strong statistical fluctuations with change of location in the same general neighborhood and with time at the same location, one also needs to reexamine the general idea of a service area for a given transmitter.

For nonfluctuating fields the idea is quite simple. The field falls off in intensity with increasing distance from the transmitter. It can be measured and described by drawing contour curves on a map at which the field assumes various values. A separate consideration based on properties of receivers leads to reasonable judgment of the minimum field strength necessary to give satisfactory reception. There will be a contour around the transmitter corresponding to this minimum field strength. On the convention being used, all receivers within this area will get service and all without, will not. The service area will be the area within the contour of minimum usable field intensity.

Let us consider how this situation is altered, in case we are dealing with a field that is subject to large fluctuations in space and time. Close to the transmitter the field will be so great that the field in all locations of such a neighborhood will, at all times, be well above the minimum field intensity needed to give a good signal. Therefore, such a region certainly belongs to the service area of the transmitter.

As one goes farther away from the transmitter, the whole field becomes weaker. This has the general effect that in such a neighborhood, there may be some locations at which the field is so weak as never to give a usable signal. Another part of the neighborhood may receive a somewhat stronger field, not enough to give a usable signal all of the time, but enough to give a usable signal a certain fraction of the time. Still another part of the neighborhood may receive such a strong signal that in spite of time fluctuations it is above minimum usable strength all of the time.

Finally at considerably greater distances there will be neighborhoods in which there are no locations which ever get a usable signal. Such areas are clearly outside the service area of the transmitter.

The intermediate areas, where some of the locations get service some of the time, clearly belong in some measure to the service area of the transmitter and should be taken into account in any adequate measure of service area of the transmitter.

A good deal of the report is concerned with defining a suitable measure of the partial service rendered by the transmitter in these intermediate areas in order that they may be taken into account. In doing this, it is necessary to distinguish between the partial service received at a particular location, and the partial service received at all the locations in a neighborhood.

At a particular receiver, a natural measure of the degree of partial service received is simply the fraction of the time in which the signal received exceeds

the minimum usable signal. If this fraction is 70 percent, this means that for 70 percent of the time a usable signal is received and for 30 percent of the time the signal is too weak to give satisfactory service. This fraction will be denoted by the letter p.

Turning now to a neighborhood, for each value of p, there will be a certain fraction of its area, denoted by q, at which receivers would receive at least the minimum usable signal for the fraction p of the time. A neighborhood will be characterized by a relation between p and q which may be graphed as in figure 1. On such a graph the curve shows a q for each p having this meaning: q is the fraction of the area in a neighborhood in which receivers would get usable signals for a fraction of the time between p and 1.

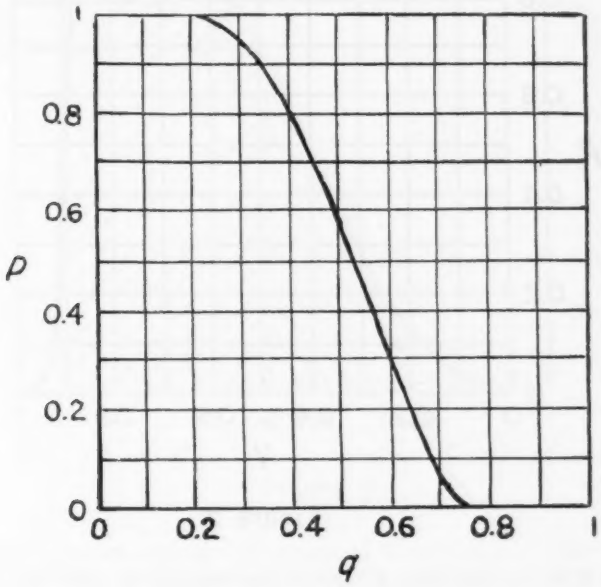


Figure 1

Thus figure 1 corresponds to a neighborhood in which 20 percent of the area gets perfect service (p=1). The fact that p=0.30 for q=0.60 in this example means that in that 60 percent of the area which includes the best receiving locations there would be all degrees of partial service ranging from the perfect service obtained by 20 percent of the area down to some part of that 60 percent in which a usable signal is only obtained 30 percent of the time. Finally, the fact that the curve has come down to p=0.00 at q=0.75 means that the remaining 25 percent of the area gets a signal that is so weak that at no time is it strong enough to be usable.

For a neighborhood which received perfect service the curve would be horizontal at p=1 across the top indicating that all of the best 100 percent locations received usable signal all of the time. Similarly, for a neighborhood receiving no service, the curve would be horizontal at p=0, indicating that not even the best small fraction of the area q=0, received a usable signal any of the time.

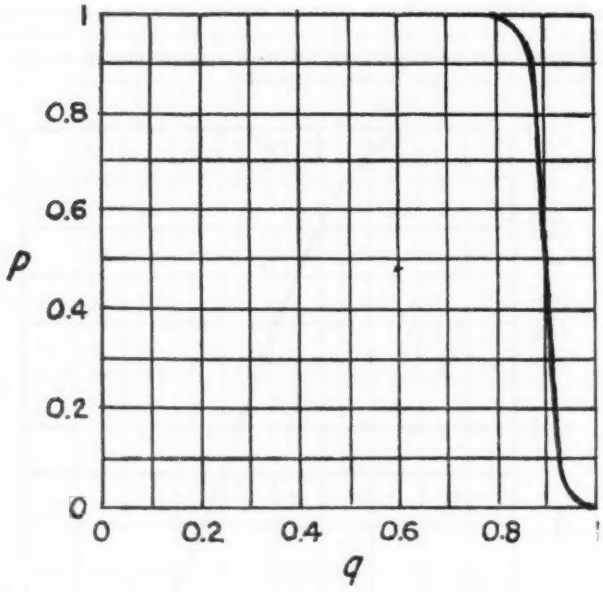


Figure 2

In figure 2 is shown the type of curve to be expected in case the time fluctuations are relatively small. In this case most of the area will receive a usable signal either nearly all the time if favorably located or not at all if unfavorably located. The value of q at which the curve falls steeply downward is then the fraction of the whole area that is favorably located. Increasing amounts of time fluctuation give rise to a curve as in figure 1 in which the slope is more gradual.

A good deal of the report is concerned with developing a method for calculating such neighborhood characteristic curves. Figure 18 of reference E is an example of one for a particular situation.

At first sight it might appear that the area under the neighborhood characteristic curve (which is always a fraction between 0 and 1) would be a suitable measure of the partial service received by such a neighborhood. Any suitable measure of partial service for a neighborhood will be designated by Q. Indeed this is a possible measure which might be adopted by mutual consent. But before deciding to do so, it is well to point out a defect from which it suffers.

It is believed that most owners of receivers, while naturally preferring perfect service, would not greatly discount service which was useful only say 90 percent or even 80 percent of the time. But if the fraction p falls too low, to say 30 or 40 percent, so that the owner will get usable signal less than half the time that he tries to use the receiver, he is apt to react in disgust and consider that partial service at as low a level as this is no service at all. While it is difficult to say quantitatively just where this effect comes in, it is nevertheless a consideration which should be taken into account in estimating the effective service area of a transmitter.

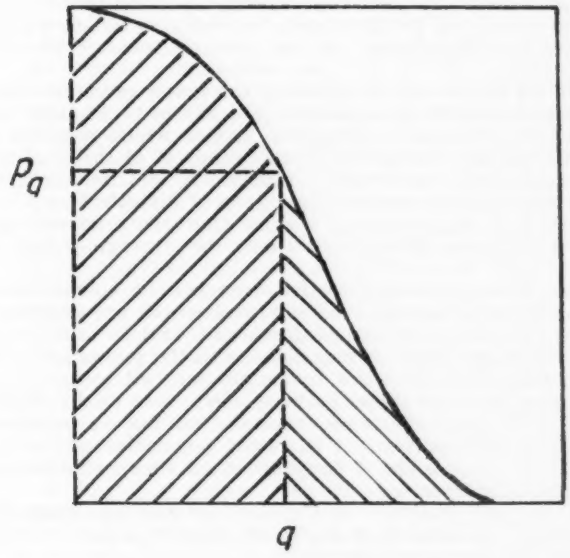


Figure 3

For example, one might decide that a partial service at a receiver which gave usable signal less than the fraction p_a of the time was not to count as service. This would amount to saying that the area under the curve that is shaded thus ////// does not count as a contribution toward the effective service area, and that the only part to be considered is that shaded thus //////.

In the report, this distinction is referred to as "Grade of Service" and calculations were carried through for various illustrative values as p=0, 0.5, 0.9, and 0.99, for example in figure 19 of reference E. After a decision on this point is reached the total effective service area of the transmitter is the sum of all the areas of each neighborhood each multiplied by its partial service factor Q. That is, if $Q_s a_s$ is such a product for the S^{th} neighborhood the whole service area for the transmitter is $A=\Sigma Q_s a_s$.

3. In the preceding section one speaks of a usable signal as being greater than a minimum usable signal. If one has adequate knowledge of the time and space fluctuations of the field of a transmitter he can express this in terms of curves of the type just discussed, for any numerical value agreed upon as representing the minimum usable signal.

The question of assigning a numerical value as minimum usable signal is not an easy one. The signal from the desired program must be strong enough relative to disturbing signals to override and give an output not too greatly disturbed.

In considering this question it is necessary to recognize that the disturbing signals are of different kinds: (a) thermal-type noise in the earlier stages of receiver, (*b*) natural, cosmic, and solar radio noise, (*c*) manmade electrical noise, and (*d*) fields from unwanted transmitters. In considering the interfering effects of the latter it is necessary to distinguish cochannel and adjacent channel operation, and also synchronized and offset cochannel operation.

Especially in television the characteristics of the disturbing signal may greatly affect the subjective degree of nuisance which it produces. There is a temptation to measure it simply by its average power level, but the truth is probably more

complicated. Likewise the question of what measure should be used of the combined nuisance value of several simultaneously occurring disturbances is one which requires more study.

A simple procedure is to regard each disturbance as measured by its average power level and to measure the combined effect of several disturbances by the total average power level of all of them. Another procedure, which may prove acceptable due to the fact that usually in practice one source of disturbance is large compared to the others, is simply to ignore all but the large one and measure the disturbance by the average power level of the largest source of disturbance.

It also has to be found out by study of television receivers how far above the disturbance power level the desired signal has to be in order to give satisfactory service. This is also a subjective matter which requires more study. It is possible to allow for the fact that some kinds of disturbance are more disturbing than their power level would indicate by setting different ratios of signal to disturbance power for different types of disturbances.

Various calculations in the report assume that the minimum usable signal needs to be 6 decibels to 40 decibels above the average power level of the disturbances.

4. For a single transmitter the service area can be calculated in principle by the method outlined in section 2. This involves the use of statistical propagation data of the type considered in references C and D, taken in combination with some determination based on decisions as to the points raised in section 3 as to a suitable numerical value for the minimum usable signal.

Instead of service area $A=\Sigma Q_s a_s$ (square miles) one might wish to measure the overall service of a transmitter by the total number of persons who might get service from the transmitter. If P_s is the population of the S^{th} neighborhood then $P=\Sigma Q_s P_s$ (thousands of persons) is an alternative measure of service area which some might prefer.

In considering two transmitters, on the same or adjacent channels and some distance apart, each one acts as a source of disturbing field to a person who is trying to receive the program of the other.

For a particular neighborhood one must now distinguish four values of Q, the partial service factors:

$$Q^A > Q^A_B$$

$$Q^B > Q^B_A$$

The Q^A and Q^B correspond to the factors for the neighborhood when a single station, A or B, is on the air, respectively. The $Q^A{}_B$ is the factor corresponding to A being the desired station in the presence of B as a disturbing station, and Q^{BA} is for B as the desired station in the presence of disturbance from A.

Similarly if there is a whole set of stations B, C, D * * * one may write $Q^A{}_{BCD}$ * * * for the reduced partial service factors for A as the desired station in the presence of the whole proposed allocation of stations.

It is now possible to calculate either the effective service area, or effective service population, for each station, using the disturbed $Q^A{}_{BCD}$ * * * in place of the undisturbed Q^A. The disturbed service areas will be reduced because the effect of any disturbance will always be to diminish the partial service factors for the neighborhoods. Thus the service rendered by any one station is reduced by the presence of the others: In this formulation it becomes in principle possible to give a numerical measure of the degree to which the service area has been diminished due to the presence of the others.

One might take as a figure of merit of a proposed allocation scheme, the sum of the service areas, or populations, of all the stations involved in the scheme. If this were done, different proposed schemes would yield different values for this figure of merit. It could then be argued that that scheme which had the largest figure of merit was the most socially desirable. However, this simple addition of areas or populations is perhaps not the best way of arriving at an overall figure of merit. Simple addition of the areas does not differentiate between an allocation plan which gives wide coverage with a single program to a large area and another which gives no service at all to some area but gets the same total sum by giving multiple service to other areas.

5. Viewed as a method of approach to the question of evaluating objectively various proposed allocation schemes, the report has presented a useful analysis, the only one made so far that attempts to take into account the whole situation with all its complications. Although the report repeatedly emphasizes the numerical uncertainty in our present knowledge of various quantities involved, it was nevertheless necessary in order to exemplify the method with specific calculations to adopt certain working numerical values and go ahead.

Some members of the committee apparently felt there was danger in doing this in that there would be a tendency to focus attention thereby more on the results of these specific calculations and less on the method they exemplify, and that the uncertainties and paucity of data supporting particular numerical assumptions would be overlooked. There is some danger of this to be sure, but the reports themselves are careful to caution the readers against this danger.

Another criticism that has been made is directed to the argument that the uncertainties in existing data are so great that such a relatively complex analysis is not warranted. To this it may be replied that although accurate specific data is meager in many imporant points, nevertheless the observational material available is adequate to establish fully the general fact that one is dealing with fields that exhibit great fluctuations in space and time thus indicating the unavoidable necessity of some such statistical treatment as the one proposed. By attempting a thorough analysis of all the factors, the report serves to direct attention to topics where further study is needed rather than using the incompleteness of our knowledge as an excuse for not making a thorough analysis.

The subject matter is inherently complex and difficult. Nevertheless it is felt that the exposition given in the report unfortunately suffers a good deal from lack of clarity and precision of expression. This has the effect at times of making the reader almost hope that the whole thing is wrong so he would be relieved of the irksome task of studying it. A sincere attempt at a better exposition of the whole matter should be made before the present reports are made the basis of any permanent doctrine in this field.

It is clear that more accurate propagation data than is at present available would be needed before anyone would be willing to use specific calculations based on the methods of the report as a means of deciding specific questions affecting station allocations. It may also be decided that, as a practical matter, an arbitary agreement to simplify the analysis by ignoring some of the complications will need to be reached. Both in the direction of indicating what kinds of further data are needed, and also in calling attention to the complicated way in which many different factors enter, the report should be useful in arriving at policy decisions as to an objective basis of allocating FM and television broadcast service in the future.

(c) CLASSIFICATION OF THE TOP 100 TELEVISION MARKETS AS NOW USED BY THE FEDERAL COMMUNICATIONS COMMISSION, WITH AN EXPLANATION AS TO THE PROCESS OF SELECTION

How Do You Arrive at the 100 Leading Markets?

I want to make three points about the definition of TV markets: (1) There is no precise criterion for evaluating a TV market. The standard metropolitan area concept which is approved by the Government is not applicable to TV because there is substantial viewing of stations located in metropolitan areas far beyond the bounds of such metropolitan areas. (2) The information with respect to each market is continually changing so that revisions of market rank are required quite frequently. Also changes in facilities affect the TV market rank. (3) Most researchers may agree within 10 or 15 as to the markets that are properly to be included within the top 100 but they will differ substantially in respect to the rank of any one market, i.e., a market which may be ranked 50th on one list may be 55, 60, or 65 on another list.

Originally we started out by using the standard metropolitan area concept but we were persuaded that it was not the best measure. In the planning that underlay the April 1959 statement, we used a list of 103 TV markets based largely on the "must buy" list of CBS and NBC. Since that time the networks have dropped the "must buy" classification and we have attempted another approach to classifying markets by using a combination criteria. Included in a composite criteria are the following: A. C. Nielsen spring 1958 nationwide

survey on total coverage of stations and daily nightly circulation of stations. In addition, we have taken into account the factors of the network time rates of the stations and the classification of markets by others, such as CBS and TV magazine. Out of these criteria has come a composite list which appears to be reasonably satisfactory. However, this list cannot be considered as fixed and final. During this year there will be additional data as a result of the American Research Bureau nationwide survey of TV coverage and soon thereafter we will have new data on population from the Census Bureau followed by a new A. C. Nielsen coverage survey. Thus, a year from now there may be some modification of our listing of the 100 top TV markets.

Top 100 markets classified as follows:

Markets with 3 or more VHF assignments	58
Markets with 2 VHF assignments	26
Markets with 1 VHF assignment	10
All UHF markets	6
Total	100

1. Markets with 3 or more commercial VHF assignments:

	Assignments
New York	7
Los Angeles	7
Chicago	4
Philadelphia	3
Boston	3
Detroit	3
San Francisco-Oakland	4
Cleveland	3
Pittsburgh	3
St. Louis	4
Washington	4
Minneapolis-St. Paul	4
Baltimore	3
Indianapolis-Bloomington	4
Cincinnati	3
Buffalo-Niagara Falls	3
Milwaukee	3
Kansas City	3
Dallas-Fort Worth	4
Atlanta	3
Seattle-Tacoma	5
Houston-Galveston	3
Albany-Schenectady-Troy	3
Memphis	3
Miami-Fort Lauderdale	4
Portland, Oreg	4
Columbus, Ohio	3
Charleston-Oak Hill-Huntington-Ashland, Ky	4
New Orleans	3
Nashville	3
Norfolk-Porthsmouth-Newport News-Hampton	3
Davenport-Rock Island-Moline	3
Greensboro-High Point-Winston-Salem	3
Omaha	3
Tampa-St. Petersburg	3
Oklahoma City-Enid	3
Denver	4
Sacramento-Stockton	3
San Diego [1]	2

[1] Tijuana station in Mexico operates as 3d station in this market.

1. Markets:

Tulsa-Muskogee	3
Green Bay-Marinette	3
San Antonio	3
Cedar Rapids-Waterloo	3
Des Moines-Ames	3
Spartanburg-Greenville-Asheville	3
Roanoke-Lynchburg	3
Richmond-Petersburg	3
Salt Like City-Provo	4
Wichita-Hutchinson	3
Portland-Poland Spring, Maine	3
Little Rock-Pine Bluff	3
Phoenix-Mesa	4
Mobile-Pensacola	3
Spokane	3
Cape Girardeau, Mo.-Paducah, Ky.-Harrisburg, Ill	3
Chattanooga-Rome	3
Orlando-Daytona	3
Duluth-Superior	4

2. Markets with two commercial VHF assignments:
   - Hartford-New Haven-New Britain-Bristol
   - Providence [1]
   - Charlotte
   - Dayton
   - Grand Rapids-Kalamazoo [1]
   - Louisville [2]
   - Birmingham [1]
   - Syracuse [3]
   - Johnstown-Altoona
   - Toledo
   - Lansing-Jackson-Parma-Onandaga
   - Rochester [3]
   - Saginaw-Bay City-Flint
   - Jacksonville
   - Raleigh-Durham
   - Knoxville
   - Wheeling-Steubenville
   - Shreveport
   - Baton Rouge
   - Jackson, Miss.
   - Sioux City
   - Terre Haute
   - Greenville-Washington, N.C.
   - Sioux Falls, S. Dak.
   - Augusta
   - Quincy-Hannibal

3. Markets with one commercial VHF assignment:
   - Lancaster-Harrisburg-Lebanon-York
   - Champaign-Urbana-Springfield-Decatur
   - Binghamton
   - Fresno [4]
   - Madison
   - Utica-Rome
   - Evansville [5]
   - Lincoln, Nebr.
   - Rockford
   - Columbia, S.C.

---

[1] Rulemaking issued to add third VHF.
[2] Show cause pending to transfer the Evansville VHF to Louisville.
[3] Petition pending to add third VHF, subject to Canadian discussion.
[4] Rulemaking to change to three VHF markets.
[5] Show cause to make all UHF.

4. All UHF markets:

	Assignments
Wilkes-Barre-Hazleton-Scranton	6
Fort Wayne	4
Springfield-Holyoke	2
Peoria	4
Youngstown-New Castle	5
South Bend-Elkhart	3

Senator PASTORE. Is Mr. Essex here? Mr. Essex, you may proceed, sir. You may testify in any way you like. If you have a written statement, you may read it.

STATEMENT OF MARTIN ESSEX, SUPERINTENDENT, AKRON PUBLIC SCHOOLS

Mr. ESSEX. Thank you, sir.

To get immediately into this topic and be respectful of your time, I shall stay closely with my manuscript, if you don't mind.

Senator PASTORE. All right, sir.

Mr. ESSEX. Mr. Chairman and members of the committee, three factors relating to the Federal allocation of television channels are of urgent concern to the citizens of Akron.

First, television has become a phenomenal medium of entertainment in our time. With the fact that millions of people are glued to the tube, it gives opportunities for growth, improvement, and advancement of our country. But not unlike newspapers, television has also demonstrated its role in serving the civic, cultural, governmental, economic, and educational life of a community. Whether it be in broadcasting the news, presentation of major community issues, staging of theater and musical events, opening up museums and galleries, showing amateur and professional sports events, or spreading the influence of education, television has proved its worth in raising the aspirations of its viewers.

I think that some people might debate that observation. I make it after considerable thought, in fact after serving for the past 2 years as president-elect and president of the Association of School Administrators, which has taken me to most of our major cities in the country, as well as our large college centers. My observations would indicate that the services of television have already been material and evident; the potential is even more miraculous than we have conceived. Thus, it is important to a city, and that is the point I am trying to make.

I observed the same thing for a month in the Soviet Union in October, where they are using television to advantage for their purposes. We, in turn, have a responsibility, I think, to use this magic medium to gain comparable achievements in our country for our purposes.

Secondly, and unfortunately, the ultrahigh frequency station in Akron has been unable to compete with the three very high frequency stations that telecast from Cleveland. The complications for the average individual with a UHF set are too annoying, expensive, and the results too uncertain for them to purchase the sets or adaptors and go through the inconvenience of tuning into a UHF channel. If you have experienced it, this is an ordeal and annoying experience.

Perhaps my experience could illustrate the problems confronting a potential viewer. Until 5 years ago I was a resident of the Cleve-

land area and accustomed to the convenience of a turn of the knob to get any of the three Cleveland very high frequency stations and to getting good reception. Upon moving to Akron, due to the nature of my work as superintendent of schools, I felt it incumbent to purchase an adaptor in order to relate myself to the community. After several service calls I was informed that there was little that could be done to improve the reception or to eliminate the necessity of remembering to turn on the adaptor, wait for a prolonged warmup, make more than the normal tuning adjustments as it fades in and out, and then to be sure to turn the adaptor off so that it would not be burned out by the time one wanted to get UHF again. You are not likely to want to use it again; but if you should, you wouldn't want your tubes burned out by this adaptor.

Frequent inquiries in recent years indicate that little has been done in research and engineering to improve these conditions. I have been inquiring and observing, and the chap on my staff who is director of television education, and in charge of it, keeps abreast of these developments. He tells me again and again that little is happening in research and engineering to improve these conditions. Apparently the market just doesn't warrant such investments. Thus, the UHF channel can't serve Akron because of the complexities, inconvenience, and expense confronting the potential viewer.

Thirdly, Akron is a separate cultural, civic, governmental, and economic entity. It is not related to Cleveland, it is a separate entity. In fact, it is the rubber capital of the world, and at the time of the last census was the 40th largest metropolitan area in the country. Television stations in another city 30 miles away have been unable to serve the needs of Akron.

May I illustrate again from a segment of the community life with which I am most familiar. This is illustrative of the thing I am saying TV can do.

The Cleveland schools have presented, for approximately a decade, a very outstanding program entitled "Meet Your Schools." It is a 15-minute program with a tremendous audience. This program permits the citizens of Cleveland to meet their schools in a very dramatic and understanding way. However, the present allocation situation does not permit the people of Akron to meet their schools. The Cleveland stations do not, and apparently cannot, serve the public interests of Akron. I believe that any fair-minded citizen would not expect them to attempt to do so.

The very outstanding adult and civic education program at the University of Akron encounters the same complexities that confront the public and parochial schools. The very large engineering societies in these great research centers of ours—the research center for rubber in our country—can't present their knowledge to the people of the community. They are hampered in the same way.

Similarly, there is no adequate public service television outlet for the important activities of the area development council that serves the counties contiguous to Summit County, where Akron is located, for our business community, our labor unions, our governmental units, and the social and cultural life of this region.

One is forced to the conclusion that wrongful use of Federal authority has resulted in discrimination against this major metropolitan

area. Further, it threatens to retard the normal advancement of Akron. I suppose one dare not speak off the record, but this week's survey showing the number of business buildings unoccupied in the heart of the city is illustrative of what I mean by this kind of saturated market from a city outside the area. Such could not be any more harmful if it were malicious and willful. It is tantamount to creating second-class citizenship for half a million people.

I am not here to speak for any broadcaster but rather in the public interest. I have been kicking this station around for a good while because I believe they are not serving the interest—and can't serve the interest—of this community, and this is a detriment to the community. This I should hasten to say is not the fault of the management of this station, because they have been very generous with their public service time. And I think it is a well-managed station, because the radio station which is associated with this television station has been a hugely successful operation down through the years, and continues to be such.

The imperativeness of one or more very high frequency channels for the Akron metropolitan area has been adequately demonstrated by our experience of the past several years. I am confident, sir, that this committee, once it has the facts, will want to give every assistance to the correction of this sorry situation that confronts this community.

Thank you.

Mr. Cox. Just one question, Mr. Essex.

It has been suggested before the committee that the public really isn't very concerned about this problem; that as long as they can get the three national services of the networks, which they can obtain from the Cleveland stations in your case, they are not writing to their Congressman or the Federal Communications Commission—they are not expressing any complaint.

Do you think this is an accurate reflection of the public attitude in Akron?

Mr. Essex. Such is not an accurate reflection, definitely, Mr. Cox. This is a complex situation with this station, as I see it—and I am not speaking for the station, again. With their hands tied behind them, trying to be subservient, cooperative and pleasant with the powers that control the situation, and thus they have done nothing to permit the community to assert itself. We, as the people responsible for the educational and civic activities of the community, are deeply disturbed. I think you can find that in the record by looking back at the letters that have come in from the organizations in the past year or two. I recall that I wrote one; the area development council has written. I wrote to our Senators, Congressmen, to the Commission. I know that the chamber of commerce and the labor unions and various groups have done that. It would be easy to blow the lid off this thing, because the citizenry are aware of the second-class status which they occupy. If anybody would just release the lid in the least, the community would assert itself very vigorously.

Senator Pastore. Thank you very much, Mr. Essex.

Mr. Putnam.

STATEMENT OF WILLIAM L. PUTNAM, PRESIDENT, SPRINGFIELD TELEVISION BROADCASTING CORP.

Mr. PUTNAM. I am glad to see you again, Senator. I wish I didn't have to be here on the same old subject.

Senator PASTORE. All right, Mr. Putnam.

Mr. PUTNAM. My name is William Lowell Putnam. I am the president of the Springfield Television Broadcasting Corp. We own and operate television stations as follows: WWLP licensed to Springfield, Mass.; WWOR licensed to Worcester, Mass.; and WRLP licensed to Greenfield, Mass., Brattleboro, Vt., and Keene, N.H. We also own and operate two translator stations carrying the WRLP signal, one into the city of Claremont, N.H., and the other into the communities of Lebanon and Hanover in New Hampshire and White River Junction in Vermont.

Mr. COX. Are those stations, Mr. Putnam, operated as satellites, or do you originate programing in Worcester.

Mr. PUTNAM. We originate—in Worcester it is almost all local origination from Worcester, whereas WRLP carries the complete network lineup from Springfield, but we originate our own local news, sports, weather, and so forth. Whenever we are doing local shows in Springfield, we do local shows on WRLP for the people of that community.

The last time I took count, we did more local programing on the Springfield station alone than all the commercial television stations in Boston put together.

The time charge for our entire facilities comes to only $700 per class A hour, and we make a profit. Last year it came to about 8 percent of our gross or about 14 percent on our invested capital.

My reason for telling you this information is so that you will understand quite clearly that fantastic earnings and rates unattainable for a local merchant are not at all requisite to make decent living and fulfilling both the letter and the spirit of the Communications Act and FCC regulations. Even in official findings of the FCC our records of service have been found exemplary.

You are conducting a hearing at this time to determine if possible what may be the Commission's policy in regard to television frequency allocations and what greater utilization may be expected of the various services now available and those that might be more fully utilized in the future. I would think that this hearing is, perhaps, as fruitless as the countless—and I am afraid I can't count how many—investigations into frequency usages, et cetera, that you and the FCC itself have put on over the past several years. What I mean is, that by now it should be abundantly clear to all parties that further studies on these matters are a complete waste of everybody's time and has the effect merely of a delaying device which further prolongs the un-American tendencies which we find in the television broadcasting business.

You are not going to get a straight answer on allocation policies from the FCC because they have no agreed policy. This group whose function it is to regulate the broadcasting industry is in reality regulated by the industry itself to the effect that this state of quasi-monopoly is actually sanctioned and perpetuated by the policies of

the Commission. Some say it is too late to do anything about UHF. They would apparently prefer to leave the American people with a hodgepodge of television service, with channels of vastly differing competitive qualities, with second class citizens on both the receiving and transmitting ends of the business, all because it is easier to do nothing then to do the right thing.

While television service in Europe and other areas is admittedly being shifted to the UHF band—in part, Mr. Chairman, because of a study made of our stations by some German officials—an unfortunate majority of our regulatory Commission seem to have the obsession that there is more VHF space to be obtained, perhaps, from the military part of the spectrum. I don't quite know what is so magic about VHF space per se. Certainly a television channel in yet another part of the band would be of no greater economic value than the present UHF channels were 8 years ago, and as a matter of fact considerably worse because there are twice as many television sets in the hands of the public now as there were when the UHF band was first opened up.

I and all other UHF operators know too well that the major problem that originally beset all those who of necessity operate stations in the UHF band has been the incompatibility of television receivers already in the hands of the public. Any of us will tell you that this and this alone has been the one real handicap. Thus finding more space in yet another part of the spectrum, which by the wholly arbitrary coincidence of nomenclature bears the name "VHF" is a ridiculous piece of name worship that would not even be considered by those who honestly understood the situation. And besides, everyone knows the military people won't part with any of their VHF space, anyway.

There are those who have said that a transition to all-UHF system would inflict a terrible hardship on the American people who would be faced, therefore, with the necessity of either buying new television sets capable of receiving the UHF channels or buying an external converter for their old television set. I just don't see how any honest person who understands prior Commission actions can take this point of view, for by its past and present allocations policies the Commission has already forced some 20 percent of the people in the United States to go to this additional expense, in some cases to receive their local television stations and in many cases to receive any television station at all. What is sauce for the goose should be sauce for the other 80 percent of the ganders. That the Commission should knowingly countenance this policy for 20 percent of the people which it can somehow now find unworkable for all of the people is rank and utter discrimination.

Senator PASTORE. Before you get off that, I think this should be said. You argue logically with regard to this last premise, but the fact of the matter is that the 20 percent of which you talk started out by buying that kind of a set. Now, as to the other 80 percent of the ganders, as you call them, they would be people that would have to go to the additional expense of converting that set now. That raises a very serious question. If you removed yourself from that side of the table and put yourself up where I am sitting, and you have everybody in your State who has a VHF set, don't tell me it is only a matter of courage for the FCC. I say all this could have been avoided, possibly,

a long time ago; but they have scrambled this so badly now it may be too hard to unscramble.

I am not getting into that, because I have been even more critical than you are; but the fact of the matter is that that has to be taken into account. You propose to come out and tell the whole body of American people, to the tune of 53 million, to go out and spend $30, because now you are going to UHF. It is harder now than it was a long time ago, and now it has become a serious political question.

Mr. PUTNAM. You are absolutely right, and I have some wisdom on that, if my wisdom is of any help to you on this.

There is a fact that I would like to correct in your impression of our stations. When we went on the air in Springfield, there were already 70 percent of the people in our area who had VHF-only sets—70 percent of the people in Springfield—and we had to convince those people to convert their sets. The Commission forced it on those people, 70 percent of my people.

Now, if they can force it on some people, there is no reason why it should not be forced on everybody.

Senator PASTORE. But, in numbers, how many sets were there at the time you went in, approximately?

Mr. PUTNAM. I would guess offhand about 30,000 sets in Springfield, itself—in that area.

Senator PASTORE. How many do you have there now?

Mr. PUTNAM. I don't really know, Senator. I am talking about homes in the city of Springfield. Now, it is probably on the order of 40,000 sets in the city of Springfield, itself—in homes in that city.

Senator PASTORE. I get the impact of your argument, but I don't want the record to stand——

Mr. PUTNAM. I agree with you, Senator——

Senator PASTORE. It has become the biggest problem of all, now, because it means dislocation and harrassment of people who have made an investment, who are the viewers, and they are the innocent people. They have had nothing to do with it. They have gone out and bought a VHF set because that is what was available, and those who bought a UHF set bought it because that was available.

There is another thing, too, in your previous paragraph; even this becomes harder, on the part of the manufacturers, because as you have brought out there should be a lot more research with reference to the receiving set itself in the UHF field, am I correct?

Mr. PUTNAM. Well, I have got some wisdom on that, too, Senator. When we first went on the air—and the testimony of Mr. Essex here shook me a little bit, because I don't agree there has been no research on UHF. When we first went on the air in Springfield, we were on channel 61. That was in 1953. We later were able to get ourselves a lower channel by reason of some changes that involved other communities. We are now on 22. This made a considerable change in our effect in the community, in large part because at that time—this was in 1953 before we got the lower channel—receivers were not working satisfactorily at the high end of the band. The 6AF4 tube was not stable at the higher end of the UHF band. The same tube that would work all right on channel 22 would be no good on 61, so that the moment we changed down, a lot of people who had gotten us originally when they got their converters, but with the passage of

time the tube got tired—all of a sudden, those people could get us on 22.

We knew we had made a substantial improvement in our audience appeal by that channel change.

Now, 2 years ago we built a translator on channel 81 in White River Junction, and we were sort of nervous about going into this translator channel 81 because of our experience with a channel only as high as 61; but we have in the last 2 years, to the best of the knowledge I have, had only one complaint of people who have found a tired tube at the high end of the band.

Senator PASTORE. But the point I make is this: Research, no matter in what field, is a continuing thing, it is an undying thing, and naturally the amount of research and the quality of research is consonant, you see, many times with the economic weight on the other side.

Mr. PUTMAN. Yes, I am with you.

Senator PASTORE. Now, the less and less the possibility of UHF enduring, the more and more reluctance on the part of the manufacturers to put money in research.

Mr. PUTNAM. I agree with you on that. It is pure economic law.

Senator PASTORE. One is tied in with the other. We have had many manufacturers come before our committee who said "Why should we build an all-purpose set if the public isn't going to buy it? Why should we charge an individual even 5 cents more than he has to spend if he is not going to use that 5 cents more?" And that makes sense. Everybody comes up here and thinks the other fellow ought to make the sacrifice. Well, this is America. It is a system of free enterprise, and businessmen will work toward profits, and there is nothing wrong with that; there is nothing unholy about that, it is a perfectly legitimate objective to work for profit.

Now, the point—as you look at that chart, there [pointing]—and I think you are quite familiar with it—you start out with 121, and you are down now to 76, and the picture gets bleaker and bleaker by the year. That means the less the possibility of UHF living, the more likelihood the manufacturers are going to begin to forget this research in UHF sets, and they are going to concentrate on VHF. That is the point I made.

If you could get a hard, well-understood policy that would make sense and be a definite one, I quite agree with you. There has been too much delaying, and too much indifference. But if you could get a stated policy on the part of the Commission that this would be the future of either VHF or UHF, I think then you could begin to ask the manufacturers to cooperate a little bit in this whole problem, to see if somehow you couldn't get more research in order to perfect some of these things that are vexing and troubling us now.

Wouldn't you agree with that?

Mr. PUTNAM. I agree, Senator; but what I am getting at is I don't find things too vexing, today. I am able to do quite well, even in the hill country of New Hampshire and Vermont. These technical problems that everybody talks about, I don't know what they are talking about. I haven't found the technical problems, and that is what infuriates me. Everybody says, "Oh, there are technical problems connected with UHF," but I don't know what they are—and I am in the business.

Senator PASTORE. Do you mean to tell me here is a Commission that came up asking for $2.25 million, and they are going to start an experimental project in New York to determine whether or not UHF can work because of the special situation inherent in New York with regard to the large buildings, and what have you. Do you mean to tell me they are just building this up in their own imagination? You mean there is nothing to it?

Mr. PUTNAM. Do we have to have this on the record?

Senator PASTORE. Well, on the record or off the record, I don't care as long as you give it to me.

Mr. PUTNAM. If you have it off the record, I had a private discussion with one of the Commissioners a while ago, and I am not sure he wants it to be public, so I could give you some information as to what this $2¼ million was for.

Senator PASTORE. Well, I think we ought to have it on the record, but don't name the person. Do you mind?

Mr. PUTNAM. I don't mind.

Senator PASTORE. I don't think they are going to get $2.25 million, anyway.

Mr. PUTNAM. As I understood it from one of the Commissioners, who is in favor of this $2.25 million, the idea would be to build a multicasting system in the city of New York in order to establish in the minds of some of the scoffers that there is no technical problem connected with UHF, even in New York. This Commissioner has the same state of mind that I do. He can't find these technical problems, and he says that the only way we are going to convince some of these guys who have this myth of technical problem in the back of their minds is to do it.

Mr. COX. This would be on the presumption that New York would present as serious problems as any community in the country.

Mr. PUTNAM. If you can lick a problem in New York, you can lick it anywhere, that is the idea.

Senator PASTORE. In contrast to what you are saying, you heard Mr. Essex. He moved from Cleveland, where it was easy to receive UHF, to Akron where he had to convert to UHF, and he had a lot of difficulty. It took longer to heat up, he had a lot of noise. I don't know who you are going to believe. This gets more confusing by the minute.

Mr. PUTNAM. I am in UHF, I think I can be regarded as an authority on it.

Senator PASTORE. Has anybody in the Commission been up to see your installation?

Mr. PUTNAM. Three of the Commissioners have been to see me. One is now a former Commissioner, the name we won't discuss, I guess; but Mr. Doerfer came up my way, and Mr. Hyde, and they are still on the Commission.

Senator PASTORE. And they were allowed to see the operation?

Mr. PUTNAM. I said, "You gentlemen can go anywhere you want, I will put a company car at your disposal." Mr. Doerfer didn't take full advantage of this, but Mr. Hyde did. Members of the staff came along. I chartered a plane and said, "I want you guys to see this, so if there is any question about anything you can get it out of your mind."

Senator PASTORE. If you were operating on the VHF instead of UHF, would you be giving any better service than you are now giving?

Mr. PUTNAM. I don't see how.

Mr. COX. Would you reach out a little farther?

Mr. PUTNAM. In some areas, yes, but not appreciably, because there are differences in propagation, but they are not notable. People are looking for programs, and they are not looking for detailed technical differences of signal quality.

As long as a picture is worth watching, people are looking for programs; and the problem that has beset UHF has been a circle, you see, of the fact they never had any audience to start with, and you have to get a break somewhere. If you don't have the audience, you are not going to get income; if you don't have income, you are not going to get any good program; if you don't have a program, you are not going to have an audience. If you get a break somewhere in that circle, then you can start the spiral going up.

The problem that UHF people have had, like in Akron—if Mr. Essex really wanted to watch that station, he would have a good tuner and he would watch that station, but the trouble is he doesn't want to because they don't have any programs. There is no real incentive on his part to watch that station.

Mr. COX. Do you find in your coverage area that you get these spots where service is not available, that is, in other words, the so-called swiss-cheese effect which has been discussed?

Mr. PUTNAM. Shadow areas?

Mr. COX. Yes.

Mr. PUTNAM. Yes; we have found there are areas behind hills in certain places where you do get a shadow effect, but this shadowing effect is most pronounced technically in that you take signal strength tests and you find—yes; there is not nearly as much signal in this particular shadowed zone, so to speak, as there is when you are in a nonshadow area.

However, the people who live in those areas aren't quite aware of the technical studies; they put up an antenna, pull in a picture, and they are happy in spite of what the engineers say. They go on watching the picture in spite of the fact the engineers say you cannot do it.

Mr. COX. Do you have to depend on CATV within your immediate coverage area or are you carried on the community antennas at a greater distance?

Mr. PUTNAM. I would like to go off the record and use profanity with respect to the CATV systems. We are carried on some of them, but those varmints have no sense of obligation to their people as far as I can determine. They refuse to carry our signal on a number of cable systems—not all of the ones in our area, but I notice one of the ones came down here and told this committee that I wanted to charge them $20,000 a year for the privilege of carrying my signal, which is a lot of hooey, a pure and unadulterated lie.

However, they import the signals from 100-some miles away, and they refuse to carry mine. This just cuts the economic heart out of the key areas and provides no economic support for my station in programing to the less densely settled rural areas around these urban centers.

Senator PASTORE. Well, without discussing who is responsible for the deficiency, of course, these people are making a profit upon that deficiency. Unless the day comes when you promote a nationwide competitive system of television, thereby giving to all people, as much as you can possibly do it, the availability of the three networks, you are going to have a situation where they are going to find any number of people who are willing to pay a certain fee in order to get that privilege.

I ran into that in Montana. We were there, and you would be surprised. There was a situation where a microwave-fed CATV in one locality had its microwave put off, and there the people rose up in protest because heretofore they had the advantage of three stations. They didn't care where it came from, but it was good entertainment; it was varied entertainment, as against the possibility of having only one.

But, on the other hand, the whole philosophy behind television is that it should be brought to the public gratis; it is free entertainment, free education. It is a medium that should be as available as possible to all our citizens in the greatest volume possible. Regrettably so, there are many localities, for reasons we don't have to debate here, that have the advantage of four and five channels; and in some places they have to be content with one, and they don't have the opportunity of seeing all the various programs that are coming over the air.

I am very much disturbed at times when members of the FCC will come here and say, "Well, our objective is to see that the people of this country have at least one." How magnanimous that is—at least one—and that accomplishes everything.

Well, that is all right if you can have only one; but when you sit back and find out that people in New York, in Miami, in Los Angeles, in Boston, in places like that, can have four or five while other people, like those in Montana, have only one, the fact of the matter is we ought to try to give them as much as we possibly can.

You run into the proposition that you have to have a certain amount of competition among all the networks, otherwise that competition will become less and less and less.

Mr. PUTNAM. The only point I was getting at on this, Senator, is that where our network programing is basically NBC—as a matter of fact, that is the only network we take anything from——

Senator PASTORE. How do you get away without "Bat Masterson"?

Mr. PUTNAM. Oh, we carry Bat.

Senator PASTORE. You don't carry "Maverick" or "Lawman."

Mr. PUTNAM. No.

Senator PASTORE. How do you get away with it?

Mr. PUTNAM. Well, I have competitors, sir.

Senator PASTORE. Oh, I see.

Mr. PUTNAM. The point I am getting at is that these cable systems will not carry my signal, but they will carry an NBC signal from 100 miles away. Here is a cable system only 30 miles from my transmitter that will not carry my signal, but will take an NBC signal from 100 miles away and put it on. You can see the economic impact it has on me.

Mr. Cox. Can the people in that community 30 miles away from Springfield get your signal off the air without being carried on the cable?

Mr. PUTNAM. This is Claremont I am talking about, to be specific, 35 miles north. They can. I built a translater there. The city of Claremont lies down in a deep hole, and in order to get them to get my signal in there I built a translater, and they are very happy. It works very nicely.

Senator PASTORE. All right; you may finish your statement.

Mr. PUTNAM. It has been stated by some on the Commission that it would be extremely unfair to those who have invested money in various broadcasting facilities to require them to alter these facilities in order to transmit on the UHF band. I am not in a position to speak for the television manufacturers, but I was just quoted a figure for a UHF transmitter, antenna, filter-plexor, monitor package by a well-known manufacturer—and no unpaid commercials here—admittedly of a relatively low power, but nevertheless for the total price of $23,000. That figure happens to be but a few days' profit—not income, but profit—on one VHF station that I know of.

Surely the vast potential in additional job opportunities, in minority-interest programing, in aid to education, in television service to local needs of our citizens, in the availability of this medium to local advertisers throughout the entire country should outweight such temporary inconvenience and relatively minor expenditure to such a few people as transition to an all-UHF system would entail.

There are those who have already found, and will continue to find, countless reasons why this idea is unworkable; but when you get to the heart of it, their true reason is merely that an extremely favorable, and in effect monopolistic, climate would no longer exist. Naturally, those who are favored by the monopoly find this whole proposal unattractive; but the function of the FCC according to the Communications Act is to protect the public interest and not the favored position of some of its licensees.

There are those who claim that the propagation characteristics in the ultra-high-frequency band are such that there would result pockets in certain areas where television service would be unattainable. These are what some people call white areas. It is certainly true that the propagation in the higher frequencies is less favorable than in the lower frequencies, but there are almost six times as many channels available, so that stations could be spaced more closely together geographically and provide much greater signal strength to every resident of the country than he presently receives and at the same time provide a local service and other much needed advantages I mentioned a minute ago.

Mr. Cox. You would have the problem of the likelihood of such stations coming into existence, though.

Mr. PUTNAM. Absolutely, as soon as there is economic support. If I can make money at $700, with all the local programing I do, which is expensive—that is what costs you money, and I do somewhat over 4 hours a day just on the Springfield station, and I do about an hour and a half on our other station. This is all within a $700 figure, both stations—good Lord, think of the potential where you have stations in Boston, where the three stations have rate cards that total

up to $8,300. If you divide that by $700, think of the economic support there is available as represented by that figure.

Now, of course, naturally it is going to be split up differently. In the bigger cities, naturally, the stations are going to have higher time charges, but there is still an awful lot of potential support, economic support there.

Mr. Cox. So you think that the channel allocations in an all-UHF system would be utilized reasonably, and certainly more extensively than they have been under the present system, with all its problems.

Mr. PUTNAM. It is bound to be, bound to be. There are so many channels available, and even with the Commission's present allocations in UHF, where they will only duplicate, in any one community, channels spaced six apart, as you are probably aware, it has been found, by the result of certain translator operations, that you could get by very well with spacing them only three channels apart, so that you can tighten up the present availabilities in UHF considerably.

Now you might question whether this is not all a figment of my imagination and that these ideas that I propose are fine in theory but obviously impractical. To this I merely answer that I am doing it today, entirely within the Commission's present rules. I have established a television system in western New England that provides local community expression and opportunities within their means to the local merchants of many communities and higher signal strength in every home of our broadcasting area than can be found in any VHF station area in the country. I do this using the Commission's present rules regarding translators and by operating with two major television facilities in western New England. So I merely say to you, Mr. Chairman, don't let anybody tell you it can't be done, don't let anybody tell you it should not be done, for, first, I am going it, and, second, the public interest requires it.

TASO was a delaying mechanism, the figment of obtaining more VHF space was a delaying mechanism, the Commission's present drop-in "interim" proposal is a delaying mechanism. There were other delaying mechanisms I could mention, but there is no value in such recriminations.

Are we to believe, however, that the problem can be solved by perpetually begging the question? The public interest requires action. All these studies and hearings have produced no really new information. But how long will the selfish interests of a relative handful of licensees be permitted to deny to the people not only the local service they deserve, but the television service our national interest demands?

Mr. Cox. Now I think this is the first time you have been before the committee since the TASO report was submitted. You were a member of the board of that organization?

Mr. PUTNAM. Yes, sir.

Mr. Cox. Would you have any comment on the conclusions which they drew with respect to UHF? I think you appended a statement to the published report indicating that your deductions from their findings were different than those which commonly seemed to be drawn. Would you have any further comments for the record?

Mr. PUTNAM. Well, my statement that Mr. Townsend and I appended to the TASO report stands for itself, and nobody can argue with it.

The fact is there. What we stated is so. TASO found nothing about UHF. TASO spent all their time proving that VHF signals go out a little further than UHF, and they surprised the hell out of themselves where they found it wasn't so in some places.

Mr. Cox. Like Fresno?

Mr. PUTNAM. Like Fresno, Buffalo, Philadelphia, and I think there were a couple of other cases where they found the VHF signal wasn't quite as good as UHF, and this shook them up no end. I remember with a certain amount of glee sitting in on some discussions and listening to the VHF boys trying to figure out they could explain it.

Senator PASTORE. Did you say "glee" or Lee? [Laughter.]

Mr. Cox. The Commissioner is sitting right behind you.

Mr. PUTNAM. Well, I am glad you are here, Commissioner, but you can speak for yourself. He wasn't with me, but I sort of felt he was, in spirit, all the time, anyway.

Mr. Cox. They were having some trouble interpreting the data in this meeting?

Mr. PUTNAM. Well, they were having some trouble explaining, trying to figure out how they could avoid interpreting this data; and this is very intriguing to me, because I have always maintained that UHF is a pretty good service. The only problem with UHF is purely economic.

Of course, Senator, the major issue facing the Commission and this committee is not a technical problem. Practically all honest engineers, including practically all the Commission's staff, all agree that UHF is technically perfectly satisfactory. I don't know any honest person who disputes that, anybody really acquainted with the facts. Practically all of us agree that it would be good for the economy of the country as a total entity, in terms of providing more job opportunities, and making the industry competitive. It would be good for the educational interest of the people, it would be good in terms of local service to the people.

The only bind comes in the political aspect of it, and this is where you come into it.

Mr. Cox. And how you get from one system to a different system.

Mr. PUTNAM. How you get from one to the other, yes; and the problem I would see you faced with is not discussing any of these other considerations at all, but trying to figure out how you can create an aura, politically, where this could be done.

Senator PASTORE. Well, I have been in this thing for a long, long time, now. Here is an example that has been batted around here, and I use the word advisedly.

I made a suggestion, and it was not a new suggestion. I thought it was new, but I found out, like everything else, that it wasn't. I suggested what is wrong, possibly, in requiring licensees, VHF licensees, if we were going to experiment successfully with an all-U system, or using 82 bands, to more or less oblige them to have, in addition to the VHF transmitter, also a UHF transmitter in the same locality. The question arises that the VHF goes further than the UHF, and that is to be admitted, but you have worked out a system of translators and boosters to reach places that were hard to reach without this assistance, or implementation.

Mr. PUTNAM. Yes.

Senator PASTORE. Are you prepared to comment at all upon the feasibility of this plan, touching on this question of transferring from one system to another with the least amount of discomfiture and harassment and expense to the viewing public?

Mr. PUTNAM. I could give you some thoughts on that, Senator, but I am not sure that was your idea; I thought it was my idea. [Laughter.]

First off, the other day Mr. Doerfer came before you, and he stated that it would cost the public $21.5 billion, as I understand it—that was the figure that I read in the trade press.

Mr. COX. 2.5.

Mr. PUTNAM. Then I think that the Radio Daily should issue an apology to Mr. Doerfer, because they have $21.5 billion, and I was prepared to raise particular Ned with Mr. Doerfer's fourth grade arithmetic.

Mr. COX. He bases this on $50 a set for 50 million sets.

Mr. PUTNAM. I see. According to the figures I have, there are 44.5 million television homes. Now I say that about 20 percent of those homes are already converted. You can argue the figure anywhere from 15 to 25, depending on whose figures you take, so I take 20. This comes out, if you figure a maximum of $50 per home—and that $50 figure is a real top one—I get this at $1,780 million. If you figure $35 per conversion, it comes only to $1,246 million; so I am prepared to take Mr. Doerfer's figures aud cut them in half.

Mr. COX. How about the feasibility of this joint broadcast—the use of dual transmitters—and the impact this might have on easing through a transitional phase?

Mr. PUTNAM. Well, there are plenty of channels available to do it; there are just all kinds of UHF channels. It would require in some instances—for instance, let's take Providence; I guess you are familiar with that area, Senator. [Laughter.] There are not enough UHF channels allocated to Providence today to do it, in that there is channel 16 and there is channel 36 allocated today in Providence. But there is a channel 25 allocated to Barnstable, and I can't see even with an all-U system how you are going to use that one. There is a channel 46 in Fall River, there is a channel 40 in New Bedford, and two more there I can't remember what they are; but there are all kinds of channels, you see, right nearby that could, in effect, be assigned to Providence within the present established mileage separation rules of UHF.

You would have to make a few changes in the present UHF allocations to do it, but there is plenty of latitude to do it is what I am getting at. Then you could assign every VHF station a UHF channel.

Now, you say to him something like this: "When your license next comes up for renewal, you must have started construction." This in the case of many people is 3 years from now, because I know we just turned in our license for renewal.

Senator PASTORE. That isn't necessary. I don't mean the obligation of starting construction; I mean if this were projected over a period of 10 years as I suggested to Mr. Lee—Mr. Lee thought 5 years, but even 15 years, some time or another. We are not talking about today.

Mr. PUTNAM. You have to make them meet a deadline, though.

Senator PASTORE. But the fact of the matter is it should be done in gradual fashion to allow the public to get full utilization of the equipment they have, so if they were going to replace it, they could replace it under the new order, and all this could be done?

Mr. PUTNAM. It could be done with no hardship.

Senator PASTORE. After all, when the Congress of the United States speaks, it speaks for history, it speaks for posterity. We don't speak alone of this generation, we speak of other generations as well; and television is with us today, and I hope for a long, long time. We hope that it will meet the needs of an explosive population. We are always talking in terms of what our population is going to be by 2000, by the year 2000. Well, after all, we can't be content with the situation as it now exists, and even the Commission has admitted there have got to be answers found.

Now, we realize that there are certain political questions that will arise—how is the public going to accept this? And all of it has to be done with the least—I repeat again, the least inconvenience to the public. Even if it did take 10 or 15 years, provided at the end of that time, at least, you would have an integrated nationwide competitive television system that would give to the people the opportunity of 70 bands as against 12.

Mr. PUTNAM. I don't think I need explain this system to you; you have already got it figured out. The only thing I can state to you on this is that you are absolutely right; there is no question or problem, except the reluctance of those people who for reasons I explained a minute ago don't want to do it.

Senator PASTORE. If you sit down and say $50 per set, 50 million sets is $2.5 billion, that is a ridiculous calculation. It isn't going to happen tomorrow; it is going to take some time. It has been estimated that the true life of a set is between 5 and 7 years, or thereabouts, maybe 10 years on the outside, and that in time these people are going to buy better sets, or new sets, so you can't figure it out that way.

Those figures are only instituted to frighten people, because they are not true figures, you see.

Mr. PUTNAM. Senator, as long as you understand the ridiculousness of that mathematics, I am content.

Senator PASTORE. I am not impugning the sincerity of people. I am merely saying that it is like a lawyer operating in the courts: he has to emphasize the points of argument that he thinks make his case a little better. But it is not so, and I think the suggestion that was made by Mr. Lee has to be given considerable—well, has to be given considerable consideration for the reason that all this has to be done with the least amount of loss on the part of, or expense on the part of, the viewing public, because unless you get them on our side you will never do anything.

Mr. PUTNAM. I think if the public knew what was being done to them they would be more outraged than I am, but they don't know.

The Commission held hearings on this payola stuff awhile ago—which was a sort of waste of time, really—but they held the hearings, anyway, and various kinds of eleemosynary groups came and said the television broadcasters must broadcast more of what people want to hear. Others came and said, "You must do more for me." These

people didn't even know there are 70 more channels: they just don't even know it.

Senator PASTORE. And the FCC is trying to tell you that you have a toothache that you haven't got? [Laughter.]

Mr. PUTNAM. Yes.

Senator PASTORE. Thank you very much.

Mr. PUTNAM. Thank you, Senator, for the pleasure of talking with you.

Senator PASTORE. The record will be open for a while—at least 2 weeks—in order for anyone else to file any statements he desires. Also, a statement will be submitted by Dr. Ed Bowles.

SKYLAND BROADCASTING CORP.,
RADIO STATION WONE,
Dayton, Ohio, February 25, 1960.

Mr. ALFRED BECKMAN,
Vice President, American Broadcasting Co.,
New York, N.Y.

DEAR SIR: In conversation with a local newspaperman yesterday, he asked why ABC in appearing before the Senate Commerce Committee had not requested Congress to place an additional VHF channel in Dayton, in addition to the 13 cities for which ABC made a similar request. I explained to him I had no information regarding the thinking of your network, but I would write you regarding this matter.

Dayton is now the 30th market of the Nation and the third market in Ohio, yet it is assigned only two VHF television channels. Many people have talked to me regarding the matter, and there is considerable feeling in this community that Dayton is entitled to receive television service which it is now missing; namely, several of the outstanding network shows.

If it is consistent with the policy of ABC, I would respectfully appreciate having the thinking of your network regarding this matter. Our interest lies solely in the fact that we had a UHF station, which we were forced to take off the air due to our inability to obtain the conversion of VHF sets.

Sincerely yours,

RONALD B. WOODYARD.

LAW OFFICES OF LOUCKS, ZIAS & JANSKY,
Washington, D.C., February 26, 1960.

Hon. JOHN O. PASTORE,
Committee on Interstate and Foreign Commerce
U.S. Senate, Washington, D.C.

DEAR SENATOR PASTORE: South Central Broadcasting Corp., licensee of UHF television station WTVK (channel 26), Knoxville, Tenn., desires to submit the following statement in connection with the recent hearings before your committee on television allocation matters.

1. Under the Federal Communications Commission's present table of assignments (sixth report and order) VHF channels 6 and 10 and UHF channels 20 and 26 (with 20 reserved for educational use) are assigned to Knoxville, Tenn. Station WATE operates on VHF channel 6, and station WBIR–TV operates on VHF channel 10. WTVK operates on UHF channel 26. No application has yet been made for educational use of UHF channel 20.

2. UHF station WTVK, which commenced operation in October 1953, was acquired by South Central on July 28, 1954. At the time of the acquisition of WTVK, television station WATE on VHF channel 6 was the only other television station in operation in Knoxville. VHF channel 10 was involved in a proceeding before the Commission. In acquiring WTVK, South Central assumed a heavy burden of existing financial obligations in order to give the people of Knoxville a choice of a second television service in accordance with the allocation principles laid down by the Commission.

3. Station WATE on VHF channel 6 is affiliated with the NBC network. Prior to the time that station WBIR–TV commenced operation on VHF channel 10, WTVK carried CBS network programs, but when WBIR–TV went on the air this arrangement was terminated by CBS and WBIR–TV was given a full

affiliation. Immediately after CBS canceled its arrangement with WTVK, the station's network revenue, national spot revenue and local advertising revenue dropped to the point where the station was forced to operate at a substantial loss. While WTVK now has an affiliation with ABC and the network has made a serious effort to sell WTVK, many large and important accounts have refused to use the station because it operates on UHF.

4. In order to provide the viewing public in Knoxville with the best possible program service and to improve its competitive position, South Central at great expense has made major improvements in its facilities by increasing the effective radiated power of station WTVK to visual 316 kilowatts and aural 158 kilowatts, installing new transmitters, and making other equipment changes. South Central has also constructed a large and modern studio and transmitter building. The establishment and improvement of UHF station WTVK has cost well over a half million dollars. Despite these substantial expenditures for improved facilities, WTVK still has not been able to compete effectively with the two VHF stations.

5. Station WTVK continues to show a loss operation, and it is confronted with a real and pressing problem of economic survival in a two VHF market where it must compete without a comparable VHF facility. As each month passes, WTVK's ratings decrease and it becomes more and more difficult to sell advertising. The last two Associated Research Bureau ratings for Knoxville show that WTVK's ratings are lower than last year and that the trend is continuing against it. There is a definite need for immediate Commission action.

6. Knoxville, Tenn., is the second largest market in the State of Tennessee, and is located in a standard metropolitan area comprised of Knox, Blount, and Anderson Counties, for which the total population is 337,105. This area ranks 50th in population among all the metropolitan areas, and showed an increase in population from 1940 to 1950 of 37 percent. Within 20 miles of Knoxville and consequently within the principal city coverage area of a Knoxville VHF station is the community of Oak Ridge, a vital center of the U.S. Government's tremendously important atomic energy program. Oak Ridge is situated considerably closer to Knoxville than to any other major city in Tennessee. The population figure for Knoxville, Tenn., does not include the population of Oak Ridge which in 1950 was 30,229, or the urbanized area outside of the city which contains an additional population of 23,397 (Census of Population, vol. 1, pp. 42–19, 42–21). A fair, efficient, and equitable distribution of available frequencies, in accordance with the mandate of section 307(b) of the Communications Act, requires that the Commission assign to Knoxville for use by WTVK a third comparable and competitive VHF facility for the purpose of serving the substantial areas and populations involved.

7. The inequitable situation which exists in Knoxville by reason of the nature of the present allocation should be well known to the Commission. South Central filed its first petition to deintermix Knoxville on October 28, 1955, and has continually sought to obtain deintermixture there. Its proposal to delete channel 7 from Spartanburg, S.C., and to assign that channel to both Knoxville, and to either Columbia, S.C., or Augusta, Ga., was denied by the Commission in a memorandum opinion and order released May 20, 1957, on the ground that the deletion of the channel (from Spartanburg) would deprive that community of an outlet able "*to compete on a comparable basis with other VHF services in the area.*" [Italic supplied.] Other alternative rulemaking proposals were also rejected. South Central has sought to obtain the allocation of a third VHF facility to Knoxville for the very reason given by the Commission in its decision in the Spartanburg case; namely, to be able "to compete on a comparable basis with other VHF services in the area." In his dissenting statement to the Commission's decision denying the Spartanburg channel 7 proposal, Commissioner Bartley stated that he would issue proposed rulemaking looking to the assignment of channel 7 to Knoxville since such proposal "would promote a more effective utilization of this VHF channel" and "it would make possible the enhancement of a competitive choice of services in large metropolitan areas resulting in improved services to a greater number of persons."

8. On March 14, 1956, Mr. John A. Engelbrecht, president of South Central Broadcasting Corp. (WTVK), Knoxville, Tenn., testified before the Senate Committee on Interstate and Foreign Commerce, in connection with the committee's investigation of UHF–VHF allocation matters, and brought to the attention of the committee the need for Commission action to eliminate the inequitable

situation in Knoxville resulting from intermixture of one commercial UHF channel with two VHF channels.

9. As you know, the Commission on January 4, 1960, adopted a notice of proposed rulemaking in docket No. 13340 proposing an interim policy with regard to the assignment of VHF television stations at shorter cochannel separations than the minimum spacings stated in the rules. The Commission's notice states that it proposes to consider applications for waivers of minimum television station separations in exceptional, individual cases meeting the following criteria:

(*a*) The assignment would make possible a second or a third VHF television station in an important television market.

(*b*) The need for the additional service outweighs the need for any service lost as a result of additional interference to existing stations.

(*c*) The new VHF service would not have substantial adverse effect on established UHF television services.

(*d*) A new assignment would not require an excessive number of channel changes of existing stations.

10. The Commission's notice also states that "it is proposed to require any new station assigned at a substandard cochannel separation to suppress radiation in the direction of the existing station to the extent necessary to insure that such new station creates no more interference to the existing station than would be caused if both stations were operating at the standard minimum spacing permitted under section 3.610 of the rules, and with maximum antenna height and power."

11. South Central believes that Knoxville, Tenn., meets the proposed criteria or conditions specified by the Commission for a shorter spaced VHF television assignment and that station WTVK can submit a proposal for operation on a VHF channel which would give existing stations protection equivalent to that provided for in the rules governing minimum spacings for maximum antenna heights and powers. Accordingly, WTVK proposes to file comments supporting the Commission's notice of proposed rulemaking.

12. It is to be noted that in connection with its efforts to obtain competitive facilities in major markets and to improve program service throughout the United States, ABC recently made and filed with the Commission a detailed study of 12 selected markets (including Knoxville), which markets presently have two VHF operations allocated to them, in order to find if additional VHF assignments could be made. In making this study an attempt was made first to find an assignable VHF channel which would meet all of the existing FCC mileage separation requirements. Since no such channels could be found, the problem was restudied applying two principles; namely, the use of directional antennas, and the use of precision offset carrier. The results of this study show that in each of the 12 selected cities, an additional VHF channel could be assigned.

13. ABC proposes the following two alternative plans for adding a third VHF channel in Knoxville, Tenn.:

	Present	Proposed
Plan 1:		
Knoxville	6, 10	2, 6, 10.
Sneedville	2[1]	
Plan 2: Knoxville	6, 10	6, 8, 10.

14. Plan 1 would delete unoccupied educational channel 2 from Sneedville, Tenn., and reallocate it to Knoxville. The move would require a directional antenna system to protect the present channel 2 operations at Atlanta, Ga., and Nashville, Tenn. The antenna location of the presently operating stations in Knoxville is 157 miles from the present channel 2 operation in Nashville and 162 miles from the location of the antenna site for which a construction permit has been issued. This would require a suppression of radiation in the direction of Nashville to 13.5 dbk to protect the present operation and 14.8 dbk to protect the operation from the site specified in the construction permit. The distance to the present operation in Atlanta from the present antenna farm location in Knoxville is 160 miles and it would require suppression of the radiated signal in the direction of Atlanta to 14.4 dbk. The suppressions in each of the above cases as well as all cases in plan 2 are based on an antenna height of 1,000 feet above

average terrain for the proposed station in Knoxville and the allowed radiation is that which would provide protection to the stations equivalent to a station located at minimum separation specified in the FCC's rules.

15. Plan 2 would add channel 8 in Knoxville. This is similar to the plan 1 proposal but does not require the deletion of a channel from another location. Current operations in Nashville and Atlanta must be protected under this plan. The distance from the antenna farm reference point in Knoxville to channel 8 in Atlanta is 161 miles and to the channel 8 operation in Nashville is also 161 miles. This will require a reduction of the signal to the south and west to 17.5 dbk in order to provide the protection afforded by a maximum power station at the standard distance.

16. Both plans allow maximum radiation in nonprotected directions, i.e., 20 dbk for channel 2 and 25 dbk for channel 8. City grade service will be provided in Knoxville from the reference location by each proposed allocation.

17. Adoption of the Commission's interim allocation policy in major scarcity markets as proposed in its notice of proposed rulemaking would permit the allocation of a third VHF facility to Knoxville. Such third VHF facility would make possible a competitive choice of services in a large metropolitan area resulting in improved services to a great number of people, and it would enable WTVK "to compete on a comparable basis with other VHF services in the area." Furthermore, such revision of allocation policy would also permit the establishment of substantially the minimum essential framework of a nationwide competitive television system without degradation of existing service or prejudice to eventual overall reallocations.

18. Since the ABC analysis of allocations for Knoxville shows that both channels 2 and 8 can be used there, one of the channels could be assigned to WTVK and the other could be made available for educational use in Knoxville. Channel 2 is presently reserved for educational use in Sneedville, a small, isolated community of some 450 people located approximately 55 miles from Knoxville, where there is no expected or foreseeable use of that channel for educational purposes. If channel 8 is allocated to Knoxville for commercial use by WTVK, channel 2 could then be allocated to Knoxville for educational use. The University of Tennessee is located in Knoxville, and it is both logical and in the public interest to allocate both channels 2 and 8 to Knoxville so that the area would be an all-VHF area for the purposes of both commercial and educational service.

19. The immediate adoption of a policy permitting mileage reductions for the limited purpose of providing a third commercial VHF channel in each of the major scarcity markets which are presently allocated only two VHF commercial channels, and the immediate adoption of amendments to section 3.610 of the rules to permit the allocation of an additional VHF channel to such specific scarcity markets, would be consistent with the Commission's repeatedly stated belief that interim steps should be taken "to improve the opportunities for effective competition among a greater number of stations."

20. Since the Commission has stated that it recognizes the urgency of taking such action in the interim as would relieve the pressing scarcities of channel assignments needed to provide at least three competitive television services in major markets, it is respectfully submitted that this committee should not only encourage but urge the Commission to bring its rulemaking proceeding to a conclusion at an early date so that applications for specific shorter spaced VHF television assignments can be filed and processed.

21. It is respectfully requested that this statement be made part of the record of the recent hearings before your committee on television allocation matters. Copies of this statement are being sent to the Chairman and members of the Federal Communications Commission.

Respectfully yours,

JOSEPH F. ZIAS,
Attorney for South Central Broadcasting Corp. (WTVK).

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., February 29, 1960.

Mr. NICK ZAPPLE,
Staff Member, Senate Interstate and Foreign Commerce Committee,
New Senate Office Building, Washington, D.C.

DEAR MR. ZAPPLE: Attached is the information on CATV systems which are not microwave-fed. These systems are classified by the six groupings used in describing the microwave-fed CATV systems, previously supplied to you. The source for the location of the CATV systems is Television Factbook, volume 29, fall–winter 1959, and is limited to CATV systems reported as in operation.

We have also added a statistical summary comparing the two groups of CATV systems, microwave-fed and nonmicrowave-fed.

If we can be of any further assistance, please let us know.

Very truly yours,

MARY JANE MORRIS, *Secretary.*

Number of communities or TV markets with CATV system [1] (microwave-fed or non-microwave-fed) and:

	Microwave-fed	Non-microwave-fed	Total
1. TV station on air	22	36	58
2. TV station now off air	2	4	6
3. CP (outstanding or canceled)	16	14	30
4. Application pending for TV station	1	4	5
5. TV assignments—no application pending	46	95	141
6. No TV assignments	33	320	353
Total	120	473	593

[1] Microwave-fed CATV systems, as of February 1960, including those granted, in CP status, or with applications pending. Data on non-microwave-fed CATV systems limited to those in operation as listed in TV Factbook, 1959 fall-winter edition, pp. 433–453.

Group 1. Communities or TV markets with CATV system and TV station on air: Classified by State and community or market

Alabama: Huntsville: 1 UHF on air.
Arizona: Tucson:
3 VHF on air.
CATV operating in Ajo within Tucson metropolitan area. Ajo has 1 UHF assignment.
California:
Los Angeles-Long Beach:
7 UHF on air.
CATV operating in Beverly Hills, Burbank, Glendale, and Santa Monica. No TV assignments.
Salinas-Monterey: 1 VHF on air.
San Diego: 2 VHF on air.
Connecticut: Hartford-New Haven-New Britain-Bristol:
2 VHF on air.
2 UHF on air.
Idaho:
Lewiston: 1 VHF on air.
Idaho Falls-Pocatello:
2 VHF on air.
1 VHF CP outstanding.
1 VHF in hearing.
Kentucky: Cape Girardeau, Mo.-Paducah-Harrisburg, Ill.: 3 VHF on air.
Louisiana:
Alexandria-Pineville: 1 VHF on air.
West Monroe: 1 VHF on air.
Massachusetts: North Adams: 1 UHF on air.

Minnesota:
- Austin-Rochester-Mason City, Iowa: 3 VHF on air.
- Duluth-Superior, Wis.:
  - 2 VHF on air.
  - 2 VHF CP's outstanding.
  - CATV operating in Ely within Duluth metropolitan area. Ely has 1 UHF assignment.

Mississippi:
- Columbus: 1 VHF on air.
- Greenwood: 1 VHF on air.

New York:
- Carthage-Watertown: 1 VHF on air.
- Elmira:
  - 1 UHF on air.
  - 1 UHF off air—available.
  - 1 UHF available.

Oregon:
- Eugene:
  - 1 VHF on air.
  - 1 VHF in hearing.
- Klamath Falls: 1 VHF on air.
- Portland:
  - 3 VHF on air.
  - 1 VHF in hearing.
- Roseburg: 1 VHF on air.

Pennsylvania: Harrisburg-Lancaster-York-Lebanon:
- 1 VHF on air.
- 4 UHF on air.

South Dakota: Lead: 1 VHF on air.

Tennessee: Bristol-Johnson City: 2 VHF on air.

Texas: Bryan-College Station: 1 VHF on air.

Vermont: Plattsburg, N.Y.-Burlington: 2 VHF on air.

Virginia: Harrisonburg: 1 VHF on air.

Washington:
- Bellingham: 1 VHF on air.
- Ephrata:
  - 1 UHF on air.
  - 1 UHF available.
- Seattle-Tacoma: 5 VHF on air.
- Walla Walla:
  - 1 UHF on air.
  - 1 UHF available.

West Virginia:
- Bluefield: 1 VHF on air.
- Clarksburg: 1 VHF on air.
- Wheeling-Steubenville, Ohio: 2 VHF on air.

Wisconsin: Wausau:
- 1 VHF on air.
- 1 VHF in hearing.

Group 2. Communities or TV markets with CATV system and TV previously in operation but now off the air; classified by State and community or market

Pennsylvania:
- Allentown-Bethlehem-Easton:
  - 3 UHF off air; CP's retained.
  - 1 UHF CP outstanding.
- Lock Haven: 1 UHF off air; CP retained.
- Reading:
  - 1 UHF off air; CP retained.
  - 1 UHF off air; available.

West Virginia: Fairmont: 1 UHF off air; available.

Group 3. Communities or TV markets with CATV system in which construction permit (CP) issued for a TV station but station has not gone on air; classified by State and community or market

Arizona: Flagstaff:
1 VHF CP now canceled; application in hearing.
1 VHF application pending.
California: San Bernardino-Riverside-Ontario:
2 UHF CP's now canceled, available.
4 UHF available.
Colorado: Sterling: 1 VHF CP outstanding.
Massachusetts: Pittsfield: 1 UHF CP now canceled, available.
Michigan: Iron Mountain: 1 VHF CP outstanding.
Minnesota: Mankato: 1 VHF CP outstanding.
Mississippi: Biloxi-Gulfport: 1 VHF CP outstanding.
New Hampshire: Keene: 1 UHF CP outstanding.
New York: Ithaca: 1 UHF CP outstanding.
Pennsylvania: Lewistown: 1 UHF CP now canceled, available.
Texas:
Alpine: 1 VHF CP now canceled, application pending.
Sherman: 1 UHF CP now canceled, available.
Virginia: Marion: 1 UHF CP now canceled, available.
West Virginia: Weston: 1 VHF CP outstanding.

Group 4. Communities or TV markets with CATV system and application pending for TV station; classified by State and community or market

Arkansas: Springdale: 1 UHF application pending.
Colorado:
Alamosa: 1 VHF in hearing.
Durango: 1 VHF application pending.
Ohio: Athens: 1 UHF application pending.

Group 5. Communities or TV markets with CATV system and 1 or more TV assignments but no applications pending for such assignments as of present; classified by State and community or market

	Assignments	Frequency
Alabama:		
Fort Payne	1	UHF.
Tuscaloosa	2	UHF.
Arizona:		
Bisbee	1	UHF.
Globe-Miami	2	UHF.
Nogales	3	UHF.
Prescott	1	UHF.
Williams	1	UHF.
Arkansas:		
Batesville	1	UHF.
Fayetteville	1	UHF.
Harrison	1	UHF.
California:		
Santa Cruz	1	UHF.
Ukiah	1	UHF.
Yreka	1	UHF.
Colorado:		
Salida	1	UHF.
Trinidad	1	UHF.
Florida: Sarasota	1	UHF.
Idaho:		
Kellogg	1	UHF.
Moscow	1	VHF.
Iowa:		
Estherville	1	UHF.
Fort Madison	1	UHF.
Kansas:		
Concordia	1	UHF.
Junction City	1	UHF.
Kentucky:		
Frankfort	1	UHF.
Harlan	1	UHF.
Pikeville	1	UHF.
Winchester	1	UHF.
Maine:		
Fort Kent	1	UHF.
Houlton	1	UHF.
Rumford	1	UHF.
Michigan: Petoskey	1	UHF.
Minnesota:		
Brainerd	1	VHF.
Fairmont	1	UHF.
New Ulm	1	UHF.
Willmar	1	UHF.
Winona	1	UHF.
Mississippi:		
Clarksdale	1	UHF.
Grenada	1	UHF.
Hattiesburg	1	UHF.
Missouri: West Plains	1	UHF.
Montana:		
Lewistown	1	VHF.
Whitefish	1	UHF.
Nebraska: Falls City	1	UHF.
Nevada: Tonopah	1	VHF.
New Hampshire:		
Berlin	1	UHF.
Claremont	1	UHF.
Laconia	1	UHF.
New Mexico:		
Hobbs	1	UHF.
Raton	1	UHF.
New York:		
Hornell	1	UHF.
Massena	1	UHF.
Olean	1	UHF.
Oneonta	1	UHF.
Saranac Lake	1	UHF.

Group 5. Communities or TV markets with CATV system and 1 or more TV assignments but no applications pending for such assignments as of present; classified by State and community or market—Continued

	Assignments	Frequency
Ohio:		
Cambridge	1	UHF.
Coshocton	1	UHF.
Oklahoma: Durant	1	UHF.
Oregon:		
Albany	1	UHF.
Astoria	1	UHF.
Bend	1	UHF.
Burns	1	UHF.
Pendleton	1	UHF.
The Dalles	1	UHF.
Pennsylvania:		
Bradford	1	UHF.
Meadville	1	UHF.
Oil City	1	UHF.
Tennessee: Kingsport	1	UHF.
Texas:		
Brady	1	UHF.
Breckenridge	1	UHF.
Coleman	1	UHF.
Denison	1	UHF.
Marfa	1	UHF.
Mineral Wells	1	UHF.
Paris	1	UHF.
Pecos	1	UHF.
Snyder	1	UHF.
Sulphur Springs	1	UHF.
Uvalde	1	UHF.
Utah:		
Price	1	VHF.
Vernal	1	VHF.
Vermont:		
Brattleboro	1	UHF.
Montpelier	1	UHF.
St. Johnsbury	1	UHF.
Virginia: Staunton	1	UHF.
Washington:		
Aberdeen	1	UHF.
Coulee Dam	1	UHF.
Everett	2	UHF.
Pullman	1	UHF.
West Virginia:		
Elkins	1	UHF.
Hinton	1	UHF.
Logan-Man	1	UHF.
Welch	1	UHF.
Williamson	1	UHF.
Wisconsin:		
Rhinelander	1	UHF.
Rice Lake	1	UHF.
Wyoming: Laramie	1	UHF.

Group 6. Communities or TV markets with CATV system and no TV assignment; classified by State and community or market

Alabama: Russellville
Arizona:
- Ray-Sonora
- San Manuel

Arkansas:
- Mena
- Rogers
- Siloam Springs

California:
- Auburn
- Banning
- Barstow
- Big Bear
- Carmel
- Dunsmuir
- Eagle Mountain Mines
- Happy Camp
- Laguna Beach
- Lake Tahoe
- Laytonville
- Martinez
- Morro Bay
- Oildale
- Placerville
- Rancho Mirage
- Sausalito
- Sonora
- Susanville
- Taft
- Tujunga
- Ventura
- Victorville

Colorado:
- Antonito
- Climax
- Estes Park
- La Jara
- Monte Vista

Idaho:
- Bonners Ferry
- Cottonwood
- Craigmont
- Elk River
- Grangeville
- Kamiah
- Ketchum-Sun Valley
- Mullan
- Orofino
- Pinehurst
- Soda Springs
- Troy
- Weippe

Illinois:
- Galena
- Marengo
- Taylorville

Indiana: Cannelton
Kentucky:
- Alva
- Barbourville
- Benham
- Brookside
- Burkesville
- Cumberland

Group 6. Communities or TV markets with CATV system and no TV assignment; classified by State and community or market—Continued

Kentucky—Continued
- Elkhorn City
- Irvine
- Liberty
- Manchester
- McDowell
- Paintsville
- Pineville
- Prestonsburg
- Ravenna
- Wheelwright
- Whitesburg

Maine:
- Dixfield
- Madawaska

Maryland:
- Friendsville
- Hancock
- Lonaconing

Massachusetts:
- Athol
- Millers Falls
- Shelburne Falls

Michigan:
- Caspian
- Norway

Minnesota: Jackson

Mississippi:
- Cleveland
- Drew
- Indianola
- Natchez

Montana:
- Big Timber
- Troy

Nebraska:
- Clatonia
- Kimball
- Sidney

Nevada: Sparks

New Hampshire:
- Colebrook
- Lebanon
- Newport

New Mexico:
- Bayard
- Grants
- Ruidoso

New York:
- Avoca
- Bainbridge
- Canisteo
- Cohocton
- Cooperstown
- Dansville
- Delhi
- Ellenville
- Horseheads
- Liberty
- Livingston Manor
- Margaretville
- Montour Falls

New York—Continued
- Napanoch
- Norwich
- Port Jervis
- Sidney
- Walton
- Wellsville
- Woodridge

Ohio:
- Benton
- Marietta
- McConnelsville
- Murray City
- Newcomerstown
- New Philadelphia
- Sugarcreek

Oklahoma:
- Granite and Sentinel
- Guymon
- Hooker
- Hugo
- Waynoka

Oregon:
- Arlington
- Bates
- Culver
- Depoe Bay
- Elgin
- Enterprise
- Fossil
- Heppner
- Hood River
- Ione
- John Day
- Lakeview
- Madras
- Mill City
- Myrtle Point
- Newport
- Oakridge
- Oceanlake
- Pilot Rock
- Prineville
- Reedsport
- Seaside
- Sheridan
- Toledo
- Warm Springs
- Wheeler
- Yachats

Pennsylvania:
- Ashland
- Avis
- Bangor
- Beaver Falls
- Bellefonte
- Blossburg
- Brandonville
- Brockton
- Brockway
- Buck Hill Falls
- Canton

Group 6. Communities or TV markets with CATV system and no TV assignment; classified by State and community or market—Continued

Pennsylvania—Continued
- Clarendon
- Clearfield
- Conemaugh
- Coshocton
- Coudersport
- Cressona
- Elizabethville
- Elkland
- Everett
- Franklin
- Galeton
- Hamburg
- Honesdale
- Howard
- Hughesville
- Isabella
- Jersey Shore
- Johnsonburg
- Lansford and Coaldale
- Lehighton
- Lykens
- Mansfield
- Meyersdale
- Millersburg
- Minersville
- Montgomery
- Mount Union
- Muncy
- Nesquehoning
- Newport
- Palmerton
- Pine Grove
- Pitcairn
- Plymouth
- Port Allegany
- Reedsville
- Renovo
- Ridgway
- Russell
- Sagertown
- St. Clair
- Sayre
- Schuylkill Haven
- Selinsgrove
- Sheffield
- Shenandoah
- Slatington
- Smethport
- Snow Shoe
- South Renovo
- State College
- Steelton
- Stroudsburg
- Susquehanna
- Tamaqua
- Tionesta
- Titusville
- Towanda
- Troy
- Warren
- Wellsboro
- Westfield
- Youngsville

South Dakota: Chamberlain

Tennessee:
- Blountville
- Copperhill
- Erwin

Texas:
- Canadian
- Comanche
- Edna
- Gatesville
- Goldthwaite
- Graham
- Madisonville
- Matador
- Muleshoe
- Ozona
- Paducha
- Palestine
- Port Lavaca
- Sanderson
- San Saba
- Shamrock
- Sonora
- Van Horn

Utah: Sunnyside

Vermont:
- Barre
- Bellows Falls
- Ludlow
- Northfield
- Springfield
- Windsor
- Woodstock

Virginia:
- Appalachia
- Grundy

Washington:
- Chehalis
- Chelan
- Cle Elum
- Colfax
- Colville
- Connell
- Dayton
- Goldendale
- Lind
- Metaline Falls
- Montesano
- North Bend
- Omak-Okanogan
- Pomeroy
- Quincy
- Raymond
- Republic
- Sedro-Wooley
- Shelton
- Soap Lake
- Sunnyside
- Tonasket
- Washtucna
- Waterville
- Wishram

Group 6. Communities or TV markets with CATV system and no TV assignment; classified by State and community or market—Continued

West Virginia:
- Amhersdale
- Berkeley Springs
- Burnsville
- Coalwood
- East Gulf
- Keyser
- Keystone
- Lost Creek
- Lumberport
- Marlinton
- Morgantown
- Moundsville
- Mount Clare
- Mullens
- New Martinsville
- Petersburg
- Phillippe
- Piedmont
- Prenter
- Rainelle
- Richwood
- Ronceverte
- Rowlesburg
- Spencer
- War
- Webster Springs
- Weirton
- Whitesville

Wisconsin: Niagara

Wyoming:
- Cokeville
- Jackson
- Kemmerer
- Mountain View
- Pine Bluffs
- Tensleep

Pickup point	Intermediate hops	Delivery point	Subscriber	Signals delivered
Andrews Tower Rentals, Inc. (CP Dec. 18, 1959) north of Lingleville, Tex. (KLN78).	1, KLN79, Comanche, Tex.	Brownwood, Tex. (1 channel).	Brownwood Television Cable Service, Inc.	WFAA-TV(8), Dallas, Tex.
Antennavision Service Co., Inc. (CP Dec. 3, 1959) (grant stayed, subject of docket No. 13385) Oatman Mountain, Ariz. (KPK30).	1, KPK31, Telegraph Pass, Ariz.	Yuma, Ariz. (4 channels).	Antennavision, Inc.	KTVK, KPHO, KOOL, KVAR, Phoenix, Ariz.
Antennavision Service Co., Inc. (licensed Mar. 24, 1958) Heliograph Peak, Ariz. (KOS63).	None	Clifton-Morenci, Ariz. (4 channels).	Clifton-Morenci Community TV.	Do.
	do	Silver City, N. Mex. (2 channels).	Antennavision of Silver City, Inc.	KTVK, KPHO, KOOL, Phoenix, Ariz. (as selected by subscriber).
	do	Safford, Ariz. (1 channel).	Antennavision, Inc.	Do.
Antennavision Service Co., Inc. (licensed Aug. 27, 1959) Hutch Mountain, Ariz. (KOU61).	do	Winslow, Ariz. (4 channels).	do	KTVK, KPHO, KOOL, KVAR, Phoenix, Ariz.
	2, KPH82, near Tuba City, Ariz., and KPH83, Jacks Peak, Ariz.	Page, Ariz. (4 channels)	do	Do.
Antennavision Service Co., Inc. (licensed June 22, 1959), Pinal Peak, Ariz. (KPB94) and Greens Peak, Ariz. (KOY44).	(1) 2 signals picked up at KPB94 and relayed to all service points via KOY44. 3d signal is picked up at KOY 44.	Holbrook, Ariz. (3 channels).	do	KTVK, KOOL, KVAR, Phoenix, Ariz.
		McNary, Ariz. (2 channels).	do	KTVK, KOOL, KVAR, Phoenix, Ariz. (as selected).
		Snowflake, Ariz. (2 channels).	do	Do.
		Springerville, Ariz. (1 channel).	Eastern Arizona Television Co., Inc.	Above Phoenix TV as selected by subscriber.
		St. Johns, Ariz. (1 channel).	do	Above Phoenix TV as selected.
Arizona Microwave System Co. (licensed Feb. 4, 1957), Mule Mountain, Ariz. (KOU84).	None	Douglas, Ariz. (2 channels).	Whitey's Television & Cable Co.	KVOA, KOLD, KGUN, Tucson, Ariz. (as selected).
Bell Telephone Co. of Nevada (licensed Aug. 21, 1956, and CP Sept. 24, 1959), Mount Rose, Nev. (licensee) (KOY38).	1, KOP54, Slide Mountain, Nev.	Reno, Nev. (3 channels)	Community Antenna Co., Inc.	KTUV, KPIX, San Francisco, Calif.; KCRA, KVIE, KTVX, Sacramento, Calif.; KOVR, Stockton, Calif. (as selected by subscriber).
(CP)	1, KOP47, Peavine Peak, Nev.	Reno, Nev. (4 channels)	do [1]	Do.
Black Hills Video Corp. (licensed Dec. 24, 1959), Davy, Tex. (KKU98).	None	Victoria, Tex. (3 channels).	Tele-Tenna Corp. of Texas.	KCOR, KENS, WOAI, KONO, San Antonio, Tex. (as selected).
Black Hills Video Corp. (licensed Sept. 6, 1957), Fredericktown, Mo. (KAR42).	do	Poplar Bluff, Mo. (3 channels).	Midwest Video Corp.	KSD, KTVI, KMOX, St. Louis, Mo.
	do	Dexter, Mo. (3 channels).	do	Do.
Black Hills Video Corp. (licensed Apr. 27, 1959), Pine Bluffs, Wyo. (KAP22).	4, KOY47, Albin, Wyo.; KAP23, Mitchell, Nebr.; KAP25, Crawford, Nebr.; KAQ88, Custer, S. Dak.	Rapid City, S. Dak. (3 channels).	Rapid City Television Corp.	KTVR, KOA, KLZ, KBTV, Denver, Colo. (as selected).
Black Hills Video Corp. (licensed June 12, 1957), Muleshoe, Tex. (KKX74).	None	Clovis, N. Mex. (2 channels).	Midwest Video Corp.	KCBD, KDUB, Lubbock, Tex.

Black Hills Video Corp. (CP Apr. 30, 1959), Jonestown, Miss. (KLH76).	1, KLH81, Mound Bayou, Miss.	Greenville, Miss. (2 channels) (application pending for 3d channel 1125/1126-C1-MP-60).	Delta Video Co.	WREC, WMCT, WHBQ, Memphis, Tenn.
Carter Mountain Transmission Corp. (licensed Mar. 5, 1957), Carter Mountain, Wyo. (KOY39).	None	Cody, Wyo. (2 channels)	Cody Community TV Corp.	KID-TV, Idaho Falls, Idahl; KTWO-TV, Casper, Wyo.
	do	Powell, Wyo. (2 channels)	Western TV Corp.	Do.
	1—KPB64, Rattlesnake Butte, Wyo.	Worland, Wyo. (1 channel).	do	KID-TV, Idaho Falls, Idaho.
	1; same as above	Basin, Wyo. (1 channel)	do	Do.
	do	Greybull, Wyo. (1 channel).	do	Do.
Carter Mountain Transmission Corp. (licensed June 5, 1958; CP Apr. 22, 1959 [1]), Copper Mountain, Wyo. (KPB65).	Licensed; 2, KID-TV; signal is relayed via KOY39 and KPB64 as shown above.	Lander, Wyo. (licensed, 1 channel).	do	Do.
	Licensed; 2, as above	Riverton, Wyo. (licensed, 1 channel).	do	Do.
	CP; [2] 2d channel service (direct off-air at KPB65).	CP (2d channel to above Riverton and Lander subscribers).		KTWO-TV, Casper, Wyo. (2d channel).
	CP,[2] for KID-TV, 2 (as above); for KTWO-TV service, none.	CP, Thermopolis, Wyo. (2 channels).	Thermopolis TV Co.	KID-TV, Idaho Falls, Idaho; KTWO-TV, Casper, Wyo.
Carter Mountain Transmission Corp. (CP Oct. 22, 1958) Sarpy Hills, Mont. (KPF75).	None	Miles City, Mont. (2 channels).	Miles City TV, Inc.	KOOK-TV and KGHL-TV, Billings, Mont.
Ceracchi & Co. (licensed Jan. 30, 1958), Worden Hill, N.Y. (KEG50).	1, KEG51, Connecticut Hills, N.Y., for WGR-TV signal. WARM-TV signal is relayed direct from off-air pickup at KEG51.	Ithaca, N.Y. (2 channels)	Ceracchi TV Corp.	WGR-TV, Buffalo, N.Y., WARM-TV, Scranton, Pa.
Collier Electric Co. (licensed July 11, 1957), Fort Morgan, Colo. (KAQ79).	None	Sterling, Colo. (3 channels).	Sterling Community TV Co.	KOA-TV, KLZ-TV, KBTV, Denver, Colo.
	1, KAQ80, Sterling, Colo.	Sidney, Nebr. (3 channels).	Sidney Community TV Co.	Same as above.
	(Licensed Apr. 14, 1959); 2, KAQ80 above and KAQ81, Sidney, Nebr.	Kimball, Nebr. (3 channels).	Kimball Community TV Co.	Do.
	(Licensed May 18, 1959); 3, KAQ80 and KAQ81 above and KAS41, Bridgeport, Nebr.	Alliance, Nebr. (3 channels).	Alliance Community TV Co.	Do.
	(CP Apr. 14, 1959); 3, same as above	Scottsbluff, Nebr.	Scottsbluff Community TV Co.	Do.
Columbia Basin Microwave (licensed May 14, 1957; CP, 3d channel, Sept. 23, 1959), Ephrata, Wash. (KOY40).	None	Moses Lake, Wash. (licensed, 2 channels).	Moses Lake TV, Inc.	KHQ-TV, KREM-TV, Spokane, Wash.
	do	Moses Lake, Wash. (CP 3d channel).	do	KXLY-TV, Spokane, Wash., in addition to above.
Dakota Microwave Co. (licensed Nov. 5, 1958), Turkey Ridge, S. Dak. (KAQ71).	do	Mitchell, S. Dak. (1 channel).	Palace Trans-Video Co.	KVTV, Sioux City, Iowa.
Dorate, Inc. (CP Sept. 10, 1959), Cordell, Okla. (KLK83).	do	Sayre, Okla. (3 channels)	Dodson TV Cable Co.	WKY-TV, KWTV, Oklahoma City, Okla.; KOCO-TV, Enid, Okla.

See footnotes at end of table, p. 4888.

Pickup point	Intermediate hops	Delivery point	Subscriber	Signals delivered
East Texas Transmission Co. (CP Apr. 30, 1959 [3]), College Mound, Tex. (KLH73).	1, KLH74, Colfax, Tex.	Tyler, Tex. (4 channels)	Television Co. of Tyler	WBAP-TV, KFJZ-TV, Fort Worth, Tex.; KRLD, WFAA-TV, Dallas, Tex.
	2, KLH74 above and KLH75, Tyler, Tex.	Jacksonville, Tex. (4 channels).	Television Cable Service Co.	Same as above.
Great Plains Microwave Co. (licensed, Jan. 5, 1959), 25 miles southeast of Perryton, Tex. (KLF26).	None	Perryton, Tex. (3 channels).	Great Plains Community TV Co.	KVII, KFDA-TV, KGNC-TV, Amarillo, Tex.
Idaho Microwave, Inc. (CP Dec. 23, 1959 [4]), near Pocatello, Idaho (KPL24).	1, KLP25 near Hansen, Idaho	Twin Falls, Idaho (2 channels).	Cable Vision, Inc	KUTV, KTVT, Salt Lake City, Utah.
Jerome, Idaho (KPL26)	None	Twin Falls, Idaho (1 channel).	do	KSL-TV, Salt Lake City, Utah.
Inland Microwave Co., Inc. (CP Apr. 14, 1959), Wallace Stool, Wash. (KPG89).	do	Wenatchee, Wash. (2 channels).	Consolidated Television Cable Corp.	KHQ-TV, KREM-TV, Spokane, Wash.
Inland Microwave Co., Inc. (CP Nov. 13, 1959), Easten, Wash. (KPK25).	1, KPK26, Mission Peak, Wash	Wenatchee, Wash. (5 channels.)	do	KOMO-TV, KING-TV, KIRO-TV, Seattle; KTNT-TV, Harper Island, Wash; KTVW-TV Tacoma, Wash.
	Same as above	Ellensburg, Wash. (5 channels).	Ellensburg-Jerrold Television Cable Corp.	Same as above.
Inland Microwave Co., Inc. (licensed July 14, 1959), St. Catherine Ridge, Iowa (KAV55).	None	Dubuque, Iowa (5 channels).	Dubuque-Jerrold Television Cable Corp.	WMT-TV, KCRG-TV, Cedar Rapids, Iowa; WOC-TV, Davenport, Iowa; KWWL-TV, Waterloo, Iowa; WHBF-TV, Rock Island, Ill.; WREX-TV, Rockford, Ill. (as selected).
Inland Microwave Co., Inc. (licensed Dec. 14, 1956), near Walla Walla, Wash. (KOS33).	do	Richland, Wash. (3 channels).	Richland TV Cable Corp.	KREM, KHQ-TV, KXLY-TV, Spokane, Wash.
	do	Kennewick, Wash. (3 channels).	Tri-City TV Service	Same as above.
	do	Pendleton, Wash. (3 channels).	Pendleton Community TV System, Inc.	Do.
Inland Microwave Co., Inc. (pending application filed Nov. 30, 1959), Apple Pie Hill, near Atlantic City, N.J.	do	Altantic City, N.J. (2 channels).	Atlantic Coast TV Cable Corp.	WOR-TV, WPIX-TV.
	1, Atlantic City, N.J.	Ventnor, N.J. (2 channels).	South Jersey Television Cable Co.	WOR-TV, WPIX-TV, New York, N.Y.
Intermountain Microwave (CP Aug. 31, 1959), Zortman, Mont. (KPJ23).	None	Glasgow, Mont. (2 channels; also see below).	Davis Radio Service	KOOK-TV, KGHL-TV, Billings, Mont.
Intermountain Microwave (CP Aug. 31, 1959), Opheim, Mont. (KPJ24).	do	Glasgow, Mont. (1 channel; also see above).	do	KUMV-TV, Williston, N. Dak.

Intermountain Microwave (licensed, Jan. 30, 1958), Mount Baldy, Mont. (KPB82).	1, KPB51, Mount Royal, Mont. (KXLY and KGEZ signals originate at KPB82 and KFBB and CJLH signals are added at KPB51. System is only 1 channel from KPB82 to KPB51 but 2 channels are provided from KPB51 to each subscriber.)	Cut Bank, Mont. (2 channels); Havre, Mont. (2 channels); Shelby, Mont. (2 channels).	Highline CATV Service, Community TV Association, Northwestern Laboratories.	KXLY-TV, Spokane, Wash.; KGEZ-TV, Kalispell, Mont.; KFBB-TV, Great Falls, Mont.; CJLH, Lethbridge, Canada (as selected by subscribers).
Intermountain Microwave (CP May 21, 1959), Mount Werner, Mont. (KPH84).	3, KPH85, Mount Aeneas, Mont.; KPB82, Mount Baldy, Mont. and KPH86, Highwood Peake, Mont. (KREM and KHQ signals originate at KPH84 but KXLY signal is added to system at KPB82 and is carried over only 1 intermediate hop (KPH86).)	Great Falls, Mont. (3 channels).	Great Falls Community TV Cable Co.	KREM-TV, KHQ-TV, KXLY, Spokane, Wash.
Major Electronics (licensed, Sept. 4, 1958), Roman Nose, near Mapleton, Oreg. (KPC73).	1, KPC72, Vaughn Point, Oreg.	Coquille, Oreg. (1 channel) (signal is delivered to subscriber at Rink, Oreg.).	Community Cable TV	KGW-TV and KOIN-TV, Portland, Oreg. (as selected).
Major Electronics (CP Feb. 2, 1960), Roman Nose, Oreg. (KPC73).	do	Coquille, Oreg. (2d service channel).	do	KGW-TV and KOIN-TV, Portland, Oreg.
		Coos Bay, Oreg. (2 channels).	Bay Television, Inc	Do.
Mesa Microwave, Inc. (CP Apr. 27, 1959 [4]), northwest of Lake City, Fla. (KIZ38).	2, KIZ39, Madison, Fla., and KJA20, Monticello, Fla.	Tallahassee, Fla. (3 channels).	Vumore Co	WJXT, WJHP-TV, WFGA-TV, Jacksonville, Fla.
Mesa Microwave, Inc. (CP Apr. 22, 1959 [4]), east of Pearsall, Tex. (KLH77).	2, KLH78, Cotulla, Tex., and KLH79, west of Encinal, Tex.	Laredo, Tex. (3 channels)	do	WOAI-TV, KENS-TV, KONO-TV, San Antonio, Tex.
Mesa Microwave, Inc. (CP July 23, 1959) southeast of Immokalle, Fla. (KJB35).	None	Naples, Fla. (3 channels)	do	WTVJ, WCKT, WPST-TV, Miami, Fla.
Mesa Microwave, Inc. (CP Aug. 28, 1959) Coldspring, Tex. (KLJ73).	1, KLJ74, Carmona, Tex	Lufkin, Tex. (2 channels)	Vumore Co. of Lufkin, Tex.	KGUL-TV, Galveston, Tex; KTRK-TV, Houston, Tex.
Mesa Microwave, Inc. (licensed Jan. 22, 1960) Muenster, Tex. (KLH82).	None	Ardmore, Okla. (2 channels).	Vumore Co	WBAP-TV, KFJZ-TV, Fort Worth, Tex.
Mesa Microwave, Inc. (licensed June 3, 1959) Silverton, Tex. (KLH35).	do	Memphis, Tex. (2 channels).	do	KGNC-TV, KFDA-TV, Amarillo, Tex.
	1, KLH36, Memphis, Tex	Childress, Tex. (2 channels).	do	Same.
	1, KLM36, Memphis, Tex	Wellington, Tex. (2 channels.)	do	Same.
Mesa Microwave, Inc. (pending application filed Jan. 12, 1960) Silverton, Tex. (KLH35).	None	Memphis, Tex. (3d service channel).	do	KVII, Amarillo, Tex., in addition to signals presently carried.
Silverton, Tex. (KLH35)	1, KLH36, Memphis, Tex	Childress, Tex. (3d service channel).	do	Do.
	do	Wellington, Tex. (3d service channel).	do	Do.

See footnotes at end of table, p. 4888.

Pickup point	Intermediate hops	Delivery point	Subscriber	Signals delivered
Mesa Microwave, Inc. (Licensed Apr. 1, 1958), Headrick, Okla. (KKY50).	None	Altus, Okla. (2 channels)	Vumore Co	WKY-TV, KWTV, Oklahoma City, Okla.
	do	Mangum, Okla. (2 channels).	do	Same.
Mesa Microwave, Inc. (pending application, filed Dec. 7, 1959), Zodletone Mountain, Okla. (new).	do	Hobart, Okla. (2 channels).	do	WKY-TV, KWTV, Oklahoma City, Okla.
	1, KKY50, Headrick, Okla	Altus, Okla. (2 channels, no change).	do	Same.
	do	Mangum, Okla. (2 channels, no change).	do	Do.
	do	Hollis, Okla. (2 channels)	Hollis Community TV System.	Do.
Microrelay of New Mexico, Inc. (CP Dec. 16, 1959 [7]), Corona, N. Mex. (KLN76).	1, KHN77, Boy Scout Mountain, N. Mex.	Roswell, N. Mex. (3 channels).	Cable TV of New Mexico	KOB-TV, KOAT-TV, KGGM-TV, Albuquerque, N. Mex.
Micro-Wave, Inc. (licensed Aug. 5, 1958), South of Spearman, Tex. (KLF92).	1, KLF93, Hoghland, Tex	Liberal, Kans. (2 channels).	TV Cable, Inc	KGNC-TV, KFDA-TV, Amarillo, Tex.
Microwave Service Co. (licensed June 22, 1959) Tupelo, Miss. (KLH80).	None	Amory, Miss. (1 channel)	Community Antenna Co	WHBQ-TV, Memphis, Tenn.
Microwave Service Co. (CP Dec. 3, 1959), Kewonville, Miss. (KLN74).	do	Tupelo, Miss. (2 channels).	Tupelo Community Antenna, Inc.	WMC, TWREC-TV, Memphis, Tenn.
Microwave Service Co. (pending application filed July 10, 1959 [8]) Jackson, Miss. (new; signals to be obtained from NBC network).	2 (new), Mechanicsburg, Miss., and Tolarsville, Miss.	Greenwood, Miss. (1 channel).	Mississippi Telecasting Co. (TV Station WABG-TV).	NBC network programs.
Midwest Microwave, Inc. (licensed April 14, 1958), Norway, Ill. (KSI55).	None	Peru, Ill. (4 channels)	Television Transmission Co.	WBBM-TV, WNBQ, WBKB, WGN-TV, Chicago, Ill.
Minnesota Microwave, Inc. (pending application filed Nov. 5, 1959), 2.5 miles Northeast of Willmar, Minn. (new).	do	Benson, Minn. (2 channels).	Benson Video, Inc	WCCO-TV, WTCN-TV, Minneapolis, Minn.
Montana Idaho Microwave, Inc. (CP Sept. 17, 1959), [9] Kimport Peak, Idaho (KPJ33).	4, KPJ34, Monida Pass; KPJ35, Armstead; KPJ36, Whitehall, KPJ37, Bozeman Pass, Mont.	Billings, Mont. (4 channels).	Midland Empire Broadcasting Co. (KGHL-TV).	KCPX-TV, KUTV, KSL-TV, Salt Lake City, Utah; KTLE-TV, Pocatello, Idaho.
	3, KPJ34, Monida Pass; KPJ35, Armstead; KPJ36, Whitehall, Mont.	Bozeman, Mont. (4 channels).	Community TV System	Do.
	2, KPJ34, Monida Pass; KPJ35, Armstead, Mont.	Dillon, Mont. (4 channels).	Vigilante Broadcasting Co., Inc.	Do.
	4, KPJ34, Monida Pass; KPJ35, Armstead; KPJ36, Whitehall; KPJ37, Bozeman Pass, Mont.	Livingston, Mont. (4 channels).	Livingston Community Antenna Association.	Do.
Montana Idaho Microwave, Inc. (Licensed June 28, 1957), Cherry Creek, Mont. (KOU85).	None	Bozeman, Mont. (1 channel).	Bozeman Community TV, Inc.	KID-TV, Idaho Falls, Idaho.

Montana Microwave, Inc. (licensed Jan. 7, 1959), Big Mountain, near Whitefish, Mont. (KOV45).	None	Kalispell, Mont. (3 channels).	Northwest Video, Inc.	KXLY-TV, KHQ-TV, KREM-TV, Spokane, Wash.
	1, KOV46, TV Mountain, Mont.	Missoula, Mont. (3 channels).	Missoula TV Cable Co.	KXLY-TV, KHQ-TV, KREM-TV, Spokane, Wash.; KXLF-TV, Butte, Mont. (as selected by subscriber).
Additional pickup point at TV Mountain, Mont. (picks up KXLF-TV, Butte, Mont.) (KOV46).	3, KOV46, TV Mountain; KPC56, Sliderock Mountain; KPC57, McDonald Pass, Mont.	Helena, Mont.[10] (2 channels).	Helena TV, Inc.	KREM-TV, KHQ-TV, Spokane, Wash.; and KXLF-TV, Butte, Mont. (as selected by subscriber).
Mountain States Telephone & Telegraph Co. (license Apr. 29, 1957) southeast of Laramie, Wyo. (KOY35).	2, KOY36, Rock River; KOY37, Hanna, Wyo.	Rawlins, Wyo. (2 channels).	Rawlins Community Television Co.	KOA-TV, KLZ-TV, KBTV, KTVR, Denver, Colo; KFBC-TV, Cheyenne, Wyo. (as selected by subscriber).
Mountain States Telephone & Telegraph Co. (license Oct. 7, 1959) southeast of Laramie, Wyo. (KOM71).	5, KON60, Chugwater; KON61, Wendover; KON62, Douglas; KON63, Orpha; KON64, Casper Junction, Wyo.	Casper, Wyo. (2 channels) (1 additional channel between KON64 and Casper for occasional use).	Community Television Systems of Wyoming.	Do.
New York Penn Microwave Corp. (licensed, 1 channel, May 2, 1958; CP, 1 channel, May 28, 1959), Canisteo Township, N.Y. (KEG41).	None	Corning, N.Y. (2 channels).	Corning Community Television Corp.	WBEN-TV, Buffalo, N.Y., WROC-TV, Rochester, N.Y.
Tower Hill, near Rutland, Pa. (KGJ35)	None (CP May 28, 1959)	Corning, N.Y. (1 channel).	do	WNEP-TV, Scranton, Pa.
North Canadian Microwave Co., Inc. (CP Nov. 19, 1959), southeast of Seiling, Okla. (KLM98).	None	Woodward, Okla. (3 channels).	True-Vue Community TV Co.	WKY-TV, KWTV, Oklahoma City; KOCO-TV, Enid, Okla.
Penn Microwave Co., Inc. (licensed, 2 channels, June 26, 1958; CP, 1 channel, Jan. 19, 1960), Pimple Hill, Pa. (KGI61).	do	Hazleton, Pa. (3 channels).	Mountain City TV Co.	WCBS-TV, WNEW-TV, WRCA-TV, New York, N.Y.
	2, KGJ66, Hazleton; KGJ67, Little Mountain, Pa.	Bloomsburg, Pa. (1 channel).	Bloomsburg Community Antenna Co.	WRCA-TV, New York, N.Y.
	Same	Williamsport, Pa. (1 channel).	Williamsport Community Antenna Co.	Do.
	do	Sunbury, Pa. (1 channel).	Sunbury Community Antenna Co.	Do.
	do	Shamokin, Pa. (1 channel).	Eastern Pennsylvania Relay Systems, Inc.	Do.
	do	Mount Carmel, Pa. (1 channel).	Jepkos TV	Do.
Potomac Valley Telecasting Corp., Spring Gap Mountain, W. Va. (KQX32).	None (licensed October 22, 1959)	Cumberland, Md. (2 channels).	Potomac Valley Telecasting Corp.	WMAL-TV, WRC-TV, Washington, D.C.
	(CP April 29, 1959)	(2 additional channels)		WTTG, WTOP-TV, Washington, D.C.

See footnotes at end of table, p. 4888.

Pickup point	Intermediate hops	Delivery point	Subscriber	Signals delivered
Service Electric Co. (licensed May 9, 1958), Pimple Hill, Pa. (KGH98).	2, KGH99, Bears Head; KGI69, Nescopeck Mountain, Pa.	Berwick, Pa. (1 channel).	Cable TV Co.	WNEW-TV, New York, N.Y.
	do	Danville, Pa. (1 channel).	Peter Walsonovitch	Do.
	3, KGH99, Bears Head; KGI69, Nescopeck Mountain; KGJ20, Montour Ridge, Pa.	Lewisburg, Pa. (1 channel).	do	Do.
	1, KGH99, Bears Head, Pa.	Mahanoy City, Pa.	John Walsonovitch	Do.
	3, KGH99, Bears Head; KGI69, Nescopeck Mountain; KGJ20, Montour Ridge, Pa.	Milton, Pa. (1 channel).	Peter Walsonovitch	Do.
	1, KGH99, Bears Head, Pa.	Pottsville, Pa. (channel).	Pottsville Trans-Video Corp.	Do.
	3, KGH99, Bears Head; KGI69, Nescopeck Mountain; KGJ20, Montour Ridge, Pa.	Watsontown, Pa. (1 channel).	Peter Walsonovitch	Do.
	None (CP July 2, 1959)	Wilkes-Barre, Pa. (1 channel).	Teleservice Co.	Do.
Service Electric Co. (pending applications, 2003 through 2006-C1-P-60), Pimple Hill, Pa. (KGH98).	None	Wilkes-Barre, Pa. (3 additional channels; 1 channel presently authorized under CP).	do	WOR-TV, WPIX, WNTA-TV, New York City, in addition to WNEW-TV.
	do	Mahanoy City, Pa. (3 additional channels, 1 channel service presently licensed).	John Walsonavitch	Same as above.
	1, KGH99, Bears Head, Pa.	Berwick, Pa. (2d channel).	Cable TV Co.	WOR-TV in addition to WNEW-TV signal presently carried.
	2, KGH, above; and KGI69, Nescopeck Mountain, Pa.	Danville, Pa. (2d channel).	Peter Walsonavitch	Same as above.
	3, KGH99 and KGI69, above; and KGJ20, Montour Ridge, Pa.	Watsontown, Pa. (2d channel).	do	Do.
	Same	Milton, Pa. (2d channel).	do	Do.
	do	Lewisburg, Pa. (2d channel).	do	Do.
Shirley Basin Transmission Co. (licensed Feb. 1, 1960), Medicine Butte, Wyo. (KPK28).	1, KPK29, White Mountain, Wyo.	Rock Springs, Wyo. (4 channels).	Sweetwater Television Co.	KUTV, KUED, KCPX-TV, KSL-TV, Salt Lake City, Utah.
	do	Green River, Wyo. (4 channels).	Green River Cable TV Co.	Do.
El Huerfano Mesa, N. Mex. (KKY43)	None (licensed Sept. 8, 1958; CP Apr. 14, 1959 (1 channel)).	Farmington, N. Mex. (4 channels).	Farmington Community Television Co.	KGGM-TV, KOAT-TV, KOB-TV, KNME-TV, Albuquerque, N. Mex.
	None (licensed Sept. 8, 1958)	Aztec, N. Mex. (1 channel).	Aztec Community Television, Inc.	KGGM-TV, Albuquerque, N. Mex.
Near Laramie, Wyo. (pending application filed June 9, 1959), (new).	2, Shirley Mountain and south of Casper, Wyo.	Casper, Wyo. (3 channels).	Community Television Systems of Wyoming, Inc.	KTVR, KOA-TV, KLZ-TV, KBTV, Denver, Colo. (as selected by subscriber).

Soo Micro Co. (licensed Jan. 8, 1960), near Harbor Springs, Mich. (KQL24).	2, KQL25, Mackinaw; KQL26, Maple Hill, Mich.	Sault Ste. Marie, Mich. (3 channels).	Great Lakes Community TV Systems, Inc.	WWTV, Cadillac; WPBN-TV, Traverse City, Mich.; WLUK-TV, Marinette, Wis.
Southern Bell Telephone & Telegraph Co. (licensed Apr. 29, 1957), Rock Harbor, Fla. (KIQ76).	4, KIQ77, Upper Metecumbe Key; KIQ78, Long Key; KIQ97, Boot Key; KIQ98, Little Torch Key, Fla.	Key West, Fla. (2 channels).	Cable-Vision, Inc.	WCKT, WTVJ, Miami, Fla.
Southwest Texas Transmission Co. (licensed Oct. 7, 1959), northeast of Uvalde, Tex. (KKY45).	1, KKY46, Las Moras, Tex.	Eagle Pass, Tex. (2 channels).	Eagle Pass Television Cable Corp.	KENS-TV, WOAI-TV, San Antonio, Tex.
	do	Del Rio, Tex. (3 channels).	Del Rio Television Cable Corp.	KENS-TV, KONO-TV, WOAI-TV, San Antonio, Tex.
St. Lawrence Microwave Co. (pending application filed Sept. 18, 1959), Gouverneur, N.Y. (new).	None	Ogdensburg, N.Y. (1 channel).	Community Antenna, Inc.	WSYR-TV, Syracuse, N.Y.
Superior Communication Co., Inc. (licensed Feb. 5, 1958), near Virginia, Minn. (KAQ73).	2, KAQ75, Gheen; KAQ74, Kabetogama, Minn.	International Falls, Minn. (2 channels).	International TV Cable Corp.	KDAL-TV, Duluth, Minn.; WDSM-TV, Superior, Wis.
Telecommunications, Inc. (licensed Mar. 21, 1958), near La Grande, Oreg. (KOS36).	None	La Grande, Oreg. (3 channels).	Eastern Oregon Television, Inc.	KXLY-TV, KHQ-TV, KREM-TV, Spokane, Wash.
	do	Baker, Oreg. (3 channels).	do	Do.
	do	Union, Oreg. (3 channels).	do	Do.
Television Microwave, Inc. (licensed Sept. 16, 1957), Spruce Mountain, Nev. (KOS34).	2, KOU61, Wells; KOU62, Elko Mountain, Nev.	Elko, Nev. (3 channels).	TV PIX, Inc.	KSL-TV, KCPX-TV, KUTV, Salt Lake City, Utah.
	None	McGill, Nev. (3 channels).	do	Do.
Teleview Networks (licensed Apr. 15, 1958), Red Cloud's Lookout, Wyo. (KOS62).	do	Sheridan, Wyo. (3 channels).	Cloud's Peak Radio & TV Corp.	KOOK-TV, KGHL-TV, Billings, Mont.; KTWO-TV, Casper, Wyo.
Tex-Mex Communications Co. (CP Nov. 19, 1959):				
Moser Ranch, Tex. (KLM97)	do	Tucumcari, N. Mex. (2 channels).	Tucumcari Television Co.	KVII, KFDA-TV, Amarillo, Tex.
Near Denver City, Tex. (KLN75)	do	Lovington, N. Mex. (2 channels).	Lovington Antenna Co.	KCBD-TV, KDUB-TV, Lubbock, Tex.
Thunder Bay Microwave Co. (licensed Jan. 26, 1960), Mount Tom, Mich. (KQH75).	do	Alpena, Mich. (3 channels).	Alpena Cable TV, Inc.	WWTV, Cadillac; WNEM-TV, Bay City; WPBN-TV, Traverse City; WJRT, Flint, Mich. (as selected by subscriber).
Upper Peninsula Microwave Co. (pending applications filed Oct. 29, 1959), near Iron Mountain, Mich. (new).	3, near Iron River, Covington West, and Houghton, Mich.	Iron City (2 channels).	Iron River Community TV Corp.	WFRV, Green Bay, Wis.; WLUK-TV, Marinette, Wis.
		Houghton, Mich. (2 channels).	Northern Community System, Inc.	Do.
		L'Anse, Mich. (2 channels).	L'Anse Cable Co.	Do.

See footnotes at end of table, p. 4888.

Pickup point	Intermediate hops	Delivery point	Subscriber	Signals delivered
Valley Microwave Corp. (licensed Nov. 5, 1959; CP, 3d channel, Jan. 21, 1960), Newburg, Ala. (KIU45).	None	Florence, Sheffield, Tuscumbia, Ala. (delivered at Florence and distributed to other locations from that point) (3 channels).	Muscle Shoals TV Cable Corp.	WAPI-TV, WBRC-TV, WBIQ, Birmingham, Ala.
Western Communication Service (licensed Jan. 21, 1960), near San Angelo, Tex. (KLJ70).	do	San Angelo, Tex. (2 channels).	San Angelo Community TV Service.	KRBC, Abilene, Tex.; KPAR-TV, Sweetwater, Tex.
Western TV Relay, Inc. (licensed June 10, 1958), Weatherford, Okla. (KLF85).	do	Elk City, Okla. (2 channels).	Community TV	KWTV, WKY-TV, Oklahoma City, Okla.

[1] 3 channels service via KOP54 is to be abandoned in favor of 4 channels authorized under CP.
[2] Effective grant date of above CP has been postponed pending final determination docket 12931.
[3] Effective grant date of above CP has been suspended pending resolution dockets 12925, 12926, 12927.
[4] Protest against grant of above CP presently under consideration.
[5] Effective date of grant postponed pending decision in dockets 12922, 12923, 12924.
[6] Effective date of grant postponed pending decision in dockets 12928, 12929, 12930.
[7] Grants set aside pending decision in docket 13395.
[8] 309(b) letter. Bell refuses network interconnection.
[9] Effective date postponed pending outcome of dockets 13266 through 13270.
[10] System not in operation; authorizations stayed pending outcome of docket No. 12932.

NOTE.—All of the foregoing information compiled as of Feb. 16, 1960.

(Whereupon, at 11 a.m., the subcommittee adjourned.)
(The following letter was submitted for the record:)

FEDERAL COMMUNICATIONS COMMISSION,
Washington, D.C., April 1, 1960.

Hon. JOHN O. PASTORE,
Chairman, Subcommittee on Communications, Senate Interstate and Foreign Commerce Committee, U.S. Senate, Washington, D.C.

DEAR SENATOR PASTORE: When the Commission testified before your Communications Subcommittee on February 2, 1960, concerning the television allocation problem, you requested that we submit on April 1, 1960, a report on the status of our discussions with the executive branch concerning the feasibility of changing the table of frequency allocations so as to improve the television allocation situation. This letter is in response to that request.

On April 30, 1959, the Federal Communications Commission announced that it and the Office of Civil and Defense Mobilization were conducting joint long-range studies to produce an improved pattern of frequency allocations. A first progress report was issued on July 30, 1959.

On December 15, 1959, after working almost continuously for a period of 6 months, the technical group engaged in this program completed a factfinding study of the radio frequency spectrum between 50 and 1215 megacycles. This study has taken into consideration the following factors:

1. Present allocations and uses being made of the spectrum between 50 and 1215 megacycles;
2. Additional requirements of non-Government and Government services, including the Commission's allocation arrangements for television broadcasting as outlined by the Commission to the Senate Interstate and Foreign Commerce Committee during the last session of the Congress;
3. Radio propagation factors influencing the choice of frequencies to be used by new or expanded services; and
4. Problems which would be involved in the transfer of services from one portion of the spectrum to another, including:
   (*a*) optimum frequencies and other technical factors influencing the choice of frequencies;
   (*b*) equipment investments; and
   (*c*) international requirements for standardized frequency allocations.

The report of this technical group and the entire question of long-range frequency allocations for the band 50–1215 megacycles are being discussed at policy level by the Commission, the OCDM, and the Federal operating agencies most directly concerned. Two such discussions have been held so far, the last one on March 31, 1960.

At the first of these meetings the Commission spokesman described to the group the general TV allocation problem we were trying to solve by proposing a division of spectrum space which would permit a TV system of 50 channels, substantially contiguous and beginning in the VHF. Spokesmen from the military agencies described the national and international problems involved in the accommodation of such a TV system and the serious impact upon national defense. Although this matter still is under study, the Commission's representatives received the impression that the executive branch representatives felt an exchange of spectrum space which would provide for such a 50-channel TV system could not be accomplished without jeopardizing national defense.

Pursuant to a request made at the first meeting, the Commission prepared and furnished to the OCDM a specific 30-channel reallocation proposal in and contiguous to the VHF which, in the Commission's judgment, represents the minimum number of channels required for television broadcasting for the foreseeable future.

The minimum plan was discussed at the second policy meeting, including the possibility of implementing it within approxmately 10 years.

Thus far, no final decisions have been reached at policy level concerning either the 50-channel or the 30-channel proposal. The Commission's specific proposals are under active study by the responsible authorities within the executive branch. Commission representatives were informed that an attempt would be made to reach a firm position on the Commission's proposals within the next 6 weeks.

Commissioner Lee is of the opinion that the course of action proposed in this letter has little chance of success and believes we should proceed with the full implementation of an all-UHF system.

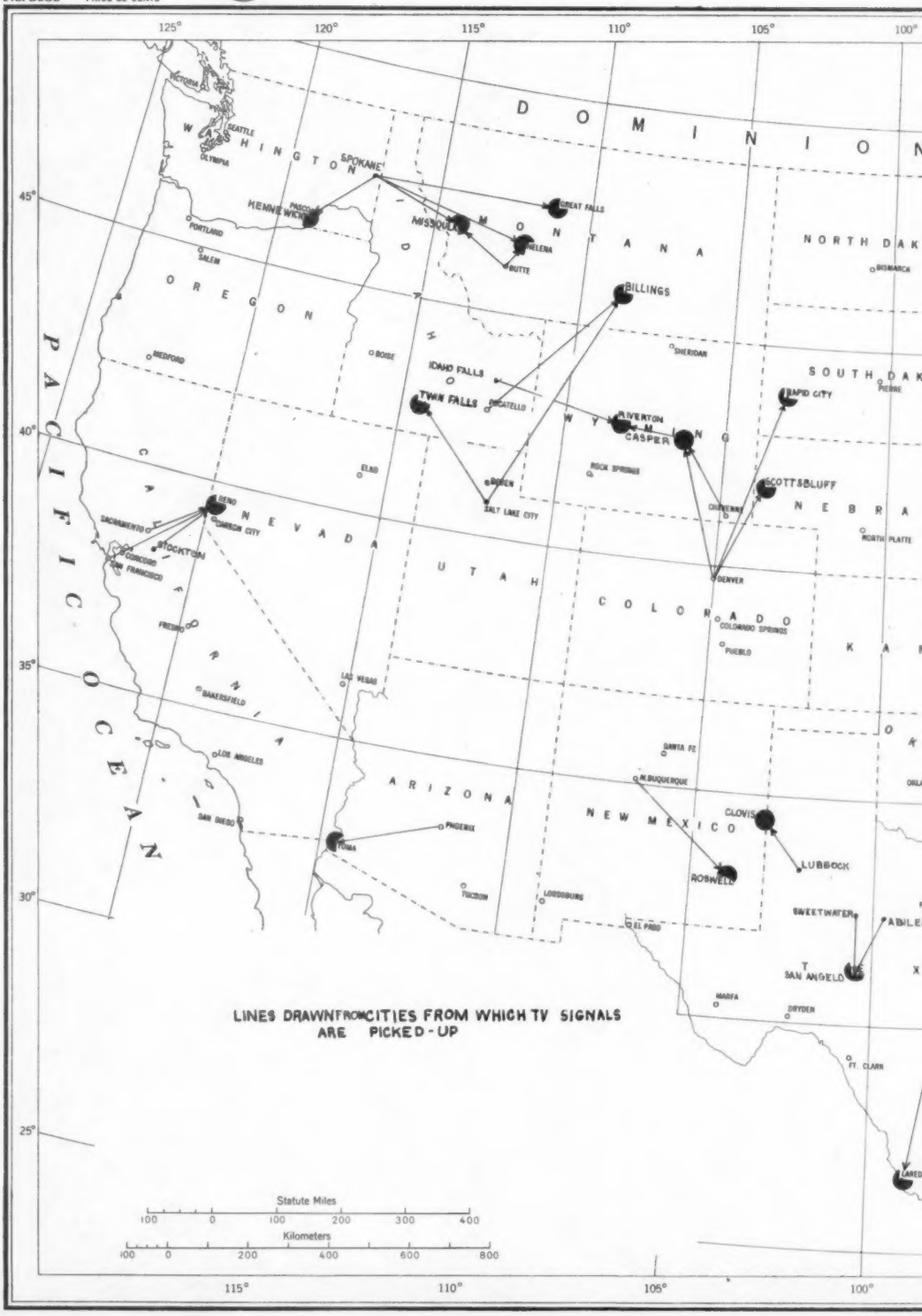
The Commission is aware of your interest in this matter and expects to keep you fully informed of developments.

By direction of the Commission:

FREDERICK W. FORD, *Chairman.*

×

No. 3086 PRICE 20 CENTS



53043 O - 60 - pt. 8 (Face p. 4890) No. 1

OUTLINE MAP
UNITED STATES

GROUP I - COMMUNITIES WITH MICROWAVE (LICENSED, CP ISSUED, OR APPLICATION PENDING)
CATV SYSTEM AND TV STATION ON AIR

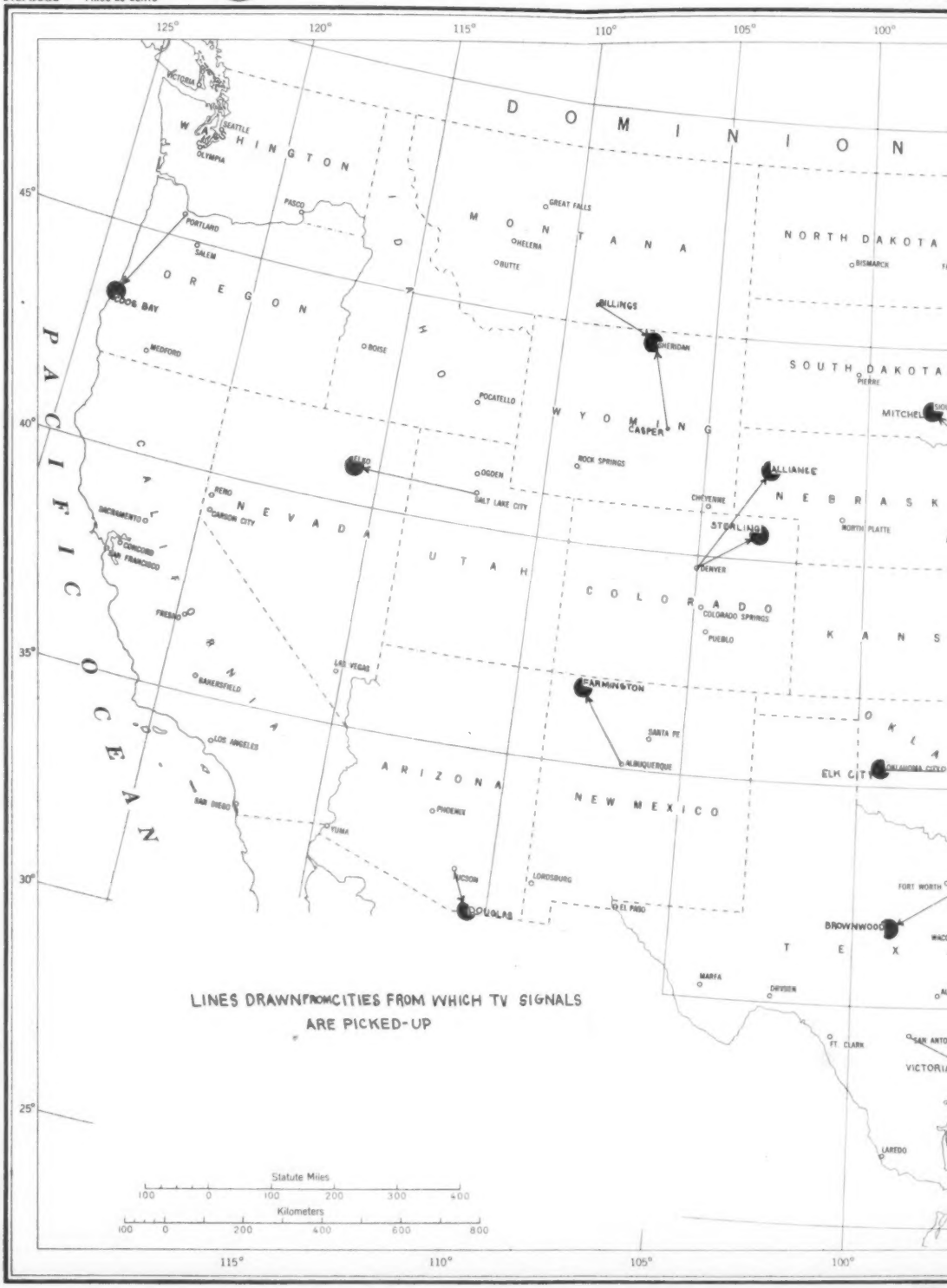
Murdoch Conic Projection, with two standard parallels

Published at Washington, D. C., Oct. 1950
U. S. COAST AND GEODETIC SURVEY
H. Arnold Karo, Director

USC&GS 3086
PRICE 20 CENTS

No. 3086 PRICE 20 CENTS

OU
UNIT



53043 O - 60 - pt. 8 (Face p. 4690) No. 2

Publish
U. S. CO

OUTLINE MAP
UNITED STATES

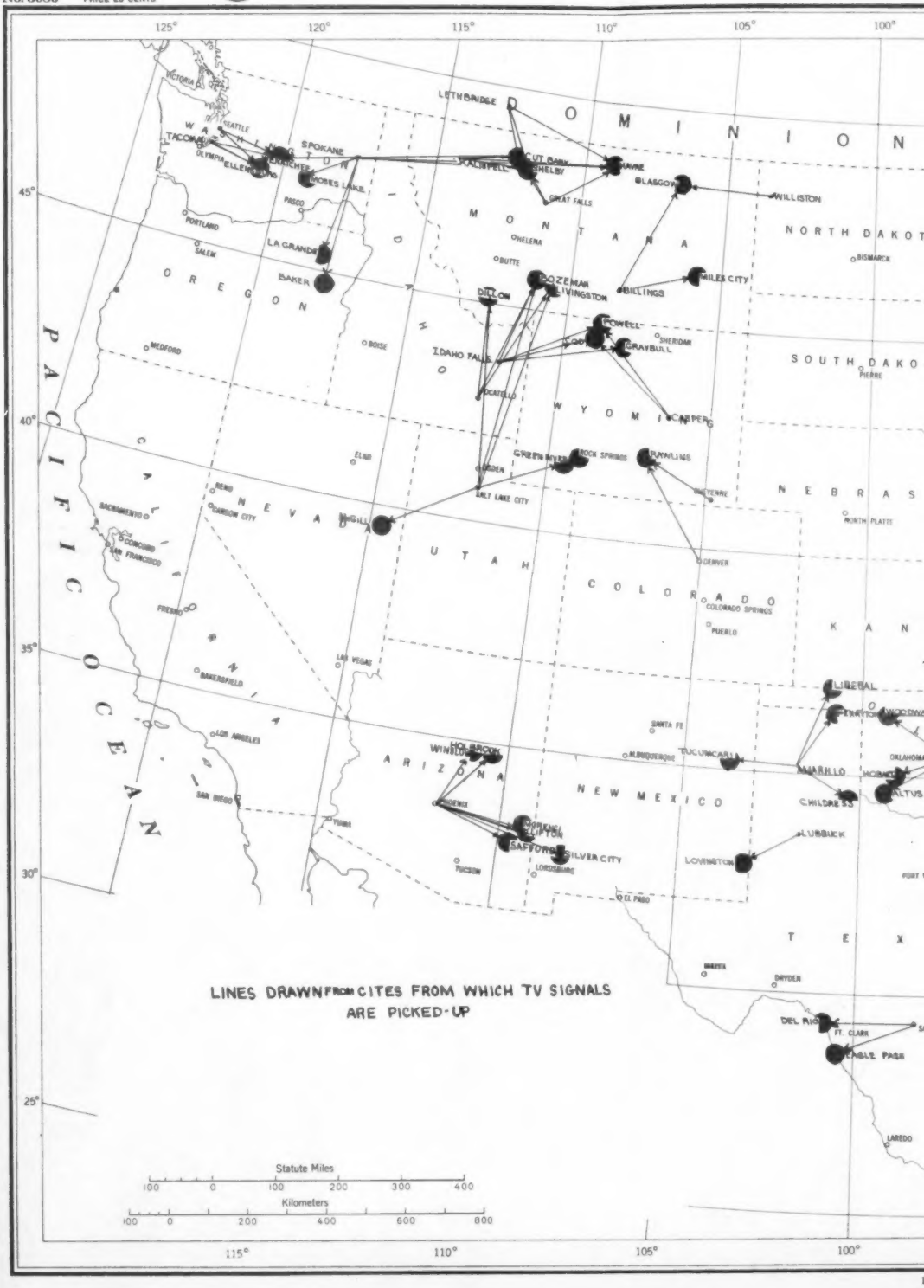
GROUP 3-COMMUNITIES WITH MICROWAVE(LICENSED,CP ISSUED,OR APPLICATION PENDING) IN WHICH CONSTRUCTION PERMIT (CP) ISSUED FOR A TV STATION BUT STATION HAS NOT GONE ON AIR

Murdoch Conic Projection, with two standard parallels

Published at Washington, D. C., Oct. 1950
U. S. COAST AND GEODETIC SURVEY
H. Arnold Karo, Director

USC&GS 3086
PRICE 20 CENTS

No. 3086 PRICE 20 CENTS



OUTLINE MAP
UNITED STATES

GROUP 5 - COMMUNITIES WITH MICROWAVE (LICENSED, CP ISSUED, OR APPLICATION PENDING) CATV SYSTEM AND 1 OR MORE TV ASSIGNMENTS BUT NO APPLICATIONS PENDING FOR SUCH ASSIGNMENTS AS OF PRESENT

Murdoch Conic Projection, with two standard parallels

Published at Washington, D. C., Oct. 1950
U. S. COAST AND GEODETIC SURVEY
H. Arnold Karo, Director

USC&GS 3086
PRICE 20 CENTS